A TREATISE

ON DESIGNING AND WEAVING.

BALDWIN.

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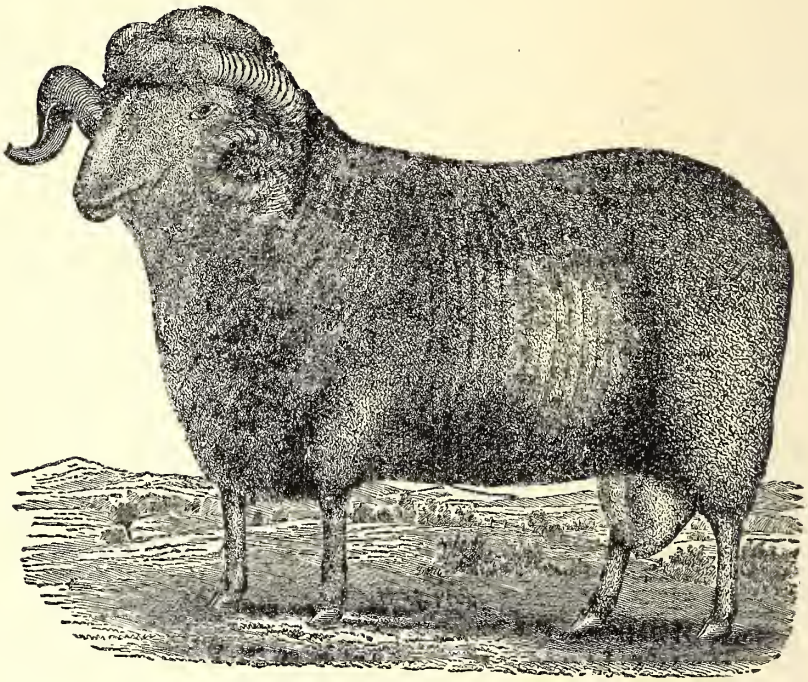

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A TREATISE

ON DESIGNING AND WEAVING

PLAIN AND FANCY WOOLEN CLOTHS.

WITH
MORE THAN
ONE HUNDRED WEAVES OF
THE LATEST AND MOST STAPLE AND
POPULAR STYLES, FROM A TWO-HARNESS PLAIN
WEAVE UP TO A FORTY-EIGHT HARNESS FANCY WEAVE,
ACCOMPANIED BY RULES AND CALCULATIONS. TOGETHER WITH MORE
THAN THIRTY ILLUSTRATED PICK-OUTS OR DIAGRAMS. ALSO, DIRECTIONS AS
TO THE MANNER OF REDUCING LARGE AND COMPLICATED DESIGNS TO
THEIR LOWEST TERMS, WITH THE CROSS-DRAWING-IN-
DRAFTS FOR THE SAME. RULES FOR PICKING
CUT SAMPLES, AND OTHER RULES AND
TABLES OF IMPORTANCE TO
MANUFACTUR-
ERS.

By A. A. BALDWIN,

WEAVER AND DESIGNER,

BRASHER FALLS,

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PREFACE.

To the art of weaving naturally belong so many separate branches differing so materially in principle, that an experienced weaver in one branch is often entirely unfamiliar with the others.

This work relates chiefly to one branch, that of weaving plain and fancy woolen cloths, in which the constant demand for novelty and variety, to keep pace with the competition of foreign manufacturers, renders a general knowledge of all its parts and details of the utmost importance both to the manufacturer and the operative workman.

In the course of the work, the different classes of weaves have been explained under their respective heads, and arranged in their simplest and most natural order, while their general connection with and dependence upon one another as a system, have been explained and illustrated in such a manner that any person of moderate acquaintance with the art, may, with a little attention, easily comprehend the whole, and be able to apply the principle of any one class of weaves to the extension and improvement of another, so as to give the greatest diversity to his patterns.

The author has endeavored to furnish such a book to the manufacturing community as he believes is needed among certain classes, and it has been his aim and object to afford, in a form which could be published at a price within the reach of all, a more comprehensive, practical work upon the chief branches of weaving, than has ever before been written, and which contains the most modern and simplified principles adhered to by the best designers and weavers. He has endeavored to follow the subject of weaving closely, but has not attempted to teach designing thoroughly, as books have already been published upon that art which do it justice. The author does not

believe that a man can become a practical weaver or designer simply by studying this book, for those arts can only be mastered by years of study and experience, as theory and practice should go together.

This work is more especially calculated for those who are familiar with the running of looms, and have a little understanding of weaves and patterns, but without much knowledge of the different classes of weaves and their construction, or of their combinations. It is believed that persons of ordinary intelligence will be able, on examination of the different pick-outs with their drawing-in-drafts, which are laid out plainly, to learn the whole art of reducing patterns and forming them into cross-draws, and with a little practice to become proficient workmen.

A. A. B.

Brasher Falls, N. Y., January, 1878.

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ERRATA.

On page 22, seventh line, read "with one thread drawn into each, etc.," instead of "two threads, etc."

Plate No. 3, Pickout No. 9, Weave 54 should be Weave 64.

Plate No. 4, Pickout No. 11, Weave 58 should be Weave 68.

Same Plate, Pickout No. 12, Weave 59 should be Weave 69.

Same Plate, Pickout No. 13, Weave 60 should be 70.

Same Plate, Pickout No. 14, Weave 61 should be 71.

A TREATISE

ON DESIGNING AND WEAVING

PLAIN AND FANCY WOOLEN CLOTHS.

CHAPTER I.

THE ART OF WEAVING.

Those who would attain to excellence in the art of Plain and Fancy Weaving should place themselves under the tuition of an experienced master, and even then they will find that a considerable practice and application will be necessary before much proficiency can be expected.

With a little attention and perseverance, however, a person of moderate capacity may soon acquire enough knowledge of the loom to enable him not only to weave any pattern from a draft, but also to put into practical shape such forms or ideas as his own fancy may suggest.

The first attempts of a learner in this art should be to acquire a thorough knowledge of the operations about the loom ; then to set his patterns up, and have them run correctly. After he has made sufficient progress in these branches, he may proceed with weaving from simple weaves, particularly at first from the least complicated specimens of the kind of patterns to which his attention is to be afterwards directed. The beginner, when first attempting to weave from his own fancy, should be very cautious as to the objects which he selects for his patterns and the manner in which they are to be woven, for his taste and judgment in making these selections and experiments will govern, in no small degree, his peculiar "style" ever after.

He will therefore be much benefited in the early stages of his progress, by procuring as great a variety of appropriate styles as possible for future use, which can be copied either from imagination or by the dissection of the original pattern, and in this way he will afterwards, with a little modification of their forms, be able to give a considerable diversity to his patterns. At the same time he ought to avoid as much

as possible a certain sameness of style, which is sometimes found in patterns even from the best designers.

The whole art of weaving can rightfully be divided into a great many different branches, which are too numerous to be laid out and explained in this small work ; but as I do not intend to go outside of the boundaries of weaving plain and fancy woolen cloths, it is not necessary (nor do I feeel competent) to speak of any branches, except those used in the manufacture of such cloths. All the diversity of which these branches are susceptible comes from the manner in which the threads of warp are separated, or the harnesses operated to receive the filling.

CHAPTER II.

TASTE IN THE SELECTION AND DESIGNING OF PATTERNS.

Designing is perhaps the most important, as well as the most delicate department in the whole course of fancy weaving, for it is on a judicious selection and extensive variety of patterns, combined with economy in the disposal of colors, that the success of the manufacture will untimately depend.

The manufacturer, therefore, though no designer himself, should possess a competent knowledge of patterns, or at least of arranging colors. This would not only improve his taste, but would enable him, when any new or striking objects occurred, to communicate his ideas with precision to the designer, and to make a more tasteful selection from the productions of others. Such is the case in some mills now, and the consequence is, patterns from those mills are usually distinguished for the ease and elegance of style, while the greatest economy is observable in the use of the materials of which they are manufactured.

On the other hand, the qualifications of a designer who would excel in his profession, are by no means of a superficial nature.

A facility in drafting or delineating any pattern that he may happen to come across, whether natural or imaginary, combined with a thorough knowledge of the principles of weaving, at least with those branches with which he is more immediately connected, are indispensable qualities.

The designer, like the poet and painter, ought to possess an unlimited fancy, and a strong and lively imagination ; to be deeply impressed with the beauties and charms of nature, and to be able to draw from them the principal effect of his designs.

A refined taste, also, is as necessary in the designer as in the manufacturer, for nothing can be more offensive to a person of genuine taste than to see a pattern crowded with an incongruous assemblage of distorted objects.

Since taste, therefore, is essential in every branch of fancy weaving and designing, as well as in the other branches of cloth manufacturing, while, at the same time, it is so very difficult to distinguish between a good taste and one of an inferior kind, it may be of use here to inquire what is the true standard by which the different tastes of men

may be compared, so as to discriminate between the true and the false.

In some men only the feeble glimmerings of taste appear, and the beauties which they relish are of the coarsest kind, and of these they have but a weak and confused impression ; while in others, taste rises to an acute discernment, and a lively enjoyment of the most refined beauties.

In general, we may observe that in the powers and pleasures of taste there is more remarkable inequality among men than is usually found in point of common sense, reason, and judgment.

The characters of taste, when brought to its most improved state, are all reduceable to two : delicacy and correctness.

Delicacy of taste respects principally the perfection of that natural sensibility on which taste is founded. It implies those finer organs of powers which enable us to discover beauties that lie hid from a vulgar eye. One may have a strong sensibility, and yet be deficient in delicate taste. He may be deeply impressed by such beauties as he perceives, but he perceives only what is in some degree coarse and bold, while chaster and simpler ornaments escape his notice. In this state, taste generally exists among the rude and unrefined.

But a person of delicate taste sees both keenly and accurately. He sees distinctions and differences where others see none, and the most simple beauty does not escape his notice, and he is sensible of the smallest blemish.

Delicacy of taste is judged by the same marks that we use in judging of the delicacy of an external sense. As the goodness of the palate is not tried by strong flavors, but by a mixture of the ingredients where, notwithstanding the confusion, we remain sensible of each, in like manner delicacy of taste appears by a quick and lively sensibility to its finest, most compound, or most latent objects.

Correctness of taste respects chiefly the improvements which that faculty receives through its connection with the understanding.

A man of correct taste is one who is never imposed upon by counterfeit beauties—who always carries in his mind that standard of good sense which he employs in judging of everything. He estimates with propriety the comparative merit of the several beauties which he meets with in any work of genius ; refers them to their proper classes, assigns the principles as far as they can be traced, from whence their power of pleasing flows, and is pleased himself precisely in that degree in which he ought, and no more.

It is true that these two qualities of taste, delicacy and correctness,

mutually imply each other. No taste can be thoroughly correct without being delicate; but still a predominancy of one or the other quality in the mixture is often visible.

The power of delicacy is chiefly seen in discerning the true merit of a work; the power of correctness in rejecting false pretensions to merit. Delicacy leans more to feeling—correctness more to reason and judgment.

The former is more the gift of nature; the latter, more the product of culture and art.

CHAPTER III.

THE ARRANGEMENT OF COLORS IN PATTERNS.

In the colored branches of fancy cassimeres, the distribution or arrangement of colors in a pattern is of no less importance than the choice of weave to apply to it; and any person who has the least experience in the arrangement of colors in patterns, will perceive that some colors will have more brilliancy and effect when placed together, than when they are placed separate or beside some others.

This arises neither from taste nor imagination, but is founded in nature, and may be explained on the principles of optics, for it is well known that the seven prismatic colors have exactly the same relation to each other as the notes in an octave in music, and therefore the effect produced by artfully disposing of the kindred colors is no less pleasing to the eye than the concords of musical sounds are grateful to the ear.

Colors, therefore, with respect to the effect which they thus produce, may be arranged under two heads—namely, those which are contrasting, and those which are harmonizing. The contrasting colors are such as are most opposed to each other; the harmonizing colors are those intermediate tints which lie between the contrasting ones, and, as it were, blend them together.

The contrasting colors may be discovered by a very simple optical experiment. Place, for example, a red wafer on a sheet of white paper, and look on it steadily for some time until the eye becomes tired, and a ring of green will begin to appear round its edge; and even after the eye has been removed to another part of the paper, the green ring will still be visible. Hence, green is said to be the contrasting color of red, and red, on the contrary, is the contrasting color of green.

In like manner it may be found that purple is the contrasting color of yellow, blue of orange, violet of a mixture of yellow and orange, and black of white.

The compounds of these colors will also have their contrasting and harmonizing ones. Thus, purple inclining to red, has for its contrasting color, yellow inclining to green; purple inclining to blue has yellow inclining to orange, and so likewise with the other compounds. On the other hand, a harmonizing color will be the nearest tint to the original, but farthest, except the original from the contrasting color.

Yellow is, therefore, the harmonizing color of white, orange of yellow, red of orange, violet of red, and blue of violet, &c.

Different shades of the same color, such as light and dark green, light and dark red, light and dark blue, etc., when they are distinct, form likewise very bold contrasts; but when the same color runs through a variety of shades, from a very dark to a very light tint, such tints approach to the nature of harmonizing colors.

CHAPTER IV.

ON "PICKING OUT," OR DRAFTING FROM SAMPLE

The ability to "pick out," or draft, from samples, is an important qualification for the designer or weaver, and is one which cannot be learned by theory, without the aid of practice. I shall give here, for the benefit of beginners, a few brief explanations of the methods ; but, for a person to become an adept in the art of picking out or drafting from sample, he should be, for some time, under the personal instructions of a practical designer, who explains, as he goes along, the manner of picking out and drafting various styles of weaving, and, at the same time, observes all false movements on the part of the learner. With all of these advantages, however, it requires a person of good intellect and judgment, with years of practice, to make a good draftsman. But it is not always the case that persons desiring to learn this art have the spare means to pay a designer for his personal services, as they would like to do, and it is more especially for such persons that the following explanations are intended. It is hoped that by closely observing them, they will, in due time and practice, make such progress as shall enable them to pick out any ordinary pattern rapidly and with ease and accuracy.

When having samples to be drafted, observe carefully, by means of a sharp knife, if there is much nap on the back of the sample ; if so, it should be removed by shaving, (care being taken not to cut the threads,) or by holding it over a lighted match and scorching off the nap, being very careful not to burn the threads. Having done this, ascertain which are the warp threads, and which the filling. This can be found by picking out a thread each way of the sample, as the warp threads are supposed to be harder twisted and stronger than the filling. Should you fail to detect them in this way, you have only one means left, and that is by the feeling of the nap on the face of the sample, which always runs with the warp ; and the surest way to detect how the nap runs is by placing the sample on your cheek, which is more sensitive to the touch than are the fingers, and moving it carefully up and down, and from right to left. In this manner you

will find that it feels smooth one way and rough the other, the smooth way indicating the way the nap lays.

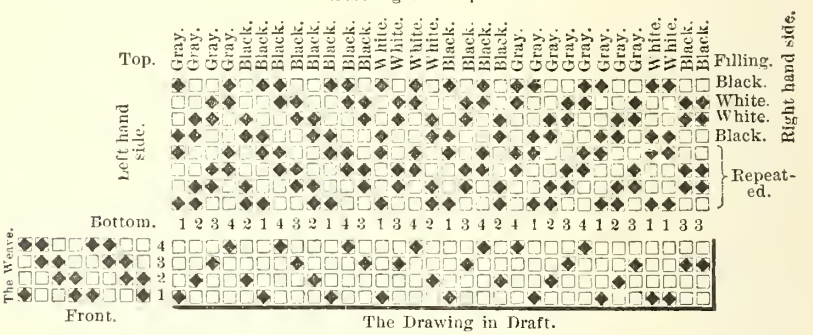
Having now satisfied yourself which way the warp and filling run, procure a few squares of designing paper and the tool used for picking with, which should be a small round-pointed awl with a handle attached that will fit your hand nicely, which should be held in the same manner as the pen when writing. Next, place the sample in the left hand, under the end of the thumb and over the fourth finger, with the next finger extended up partly over the fourth finger, holding the sample down tightly, and at the same time ready to receive all threads that have been passed by examined, under it, and out of the way of the others. The sample being held now in the right position, proceed with picking out the filling threads from the warp until you have about one-quarter of an inch freed from the filling, this being sufficient to begin picking with. Cut off the warp threads at the right hand corner for a space of about one-half of an inch, and close up to the filling threads. Everything is now in readiness for business, and the picking out is continued as follows (beginning always at the right-hand side, and reading to the left):

Raise one filling thread up from the rest with the point of the awl, sufficient to detect whether it passes over or under the warp threads. If it passes under, then of course the warp thread was raised to admit the filling in passing under. Therefore, call it one *up*, and note it down on the design paper by the character X; at the same time write down the color of the warp thread over the top, and the filling thread at the right. Having done this, pass the warp thread examined under the third finger, and take up the next one in rotation (being careful not to get them crossed); and if it is found under the filling thread, then it must have been down, to have allowed the filling to pass over it. Therefore, call it *one down*, and note the same on the paper by leaving a blank space, or making a dot *thus* •, and in this manner keep passing to the left, noting down all the warp threads as they appear over and under the filling, until you find a repeat, or get the width of the pattern; then withdraw that filling thread and raise another, and proceed the same as before; and then another, and another, and so on, until you find a repeat in the filling. This giving a repeat both ways, you have the picking out completed; and if the pattern is found to be too large to weave with a straight draft, it must be reduced, which is accomplished in the following manner:

Begin with the first warp thread at the left hand side, and mark it No. 1; then pass on to the right, looking for more threads woven in

the same manner, reading from top to bottom, so many *up* and so many *down*, and *all* threads found to read the same as No. 1 mark them with a figure 1. Then begin back again and mark the second thread No. 2 (if not like the first), and continue with this the same way as before, and in like manner keep proceeding until every warp thread in the pickout is numbered ; and as these numbers read, so are they to be drawn into the harnesses, each number to be drawn on to a corresponding number of a harness, and the highest number denotes the number of harnesses required to weave the same. (It will be seen that the pickouts in this work and the drawing-in drafts are governed by this principle.)

The more fully to illustrate the preceding remarks, I have placed below an illustration of a small pickout, which will more clearly show their meaning.



Reading from top to bottom shows the manner each warp *thread is woven in.*
Reading from right to left, shows the manner each filling thread is woven in.

In the above illustration, as the threads appear at the top of pickout, so do they appear in the sample, and the same with the filling threads at the right.

There are, of course, exceptions in all cases, and the reader may often find it more convenient to pick out the warp threads instead of the filling, and in such a case hold the sample in same manner as before (reading from the right to the left), and all threads that appear up call them *down*, and those that appear down call them *up*, bearing in mind to note them down on the designing paper as reading *upwards* from the *bottom* to the *top*.

CHAPTER V.

ON WEAVING PLAIN CLOTH

Having given an idea of what is necessary to the attainment of excellence in the art of plain and fancy weaving, it will now come in place to exhibit a few appropriate weaves used in the manufacturing of plain cloths. The first of these in order is the original two harness weave, which is thus :

Weave No. 1.

1 2

This is the principal weave used in making all kinds of flannels, prints, ginghams, and other finer grades of dress goods ; it is also used to a certain extent in weaving a variety of fine light weight cassimeres for summer use.

Each thread of filling passes over and under a thread of warp alternately ; and by dressing a warp of one thread drab and one of white alternately, and using filling the same, it produces a perfect hair line by having the drab filling thread pass under the white warp and over the drab, and the white to pass over the white and under the drab, and in like manner with any two colors desired. And, again, it is used in weaving fine double and twist goods, when several colors are to be displayed equally.

In weaving fine goods where more ends are used in the warp than would be practicable for the working of two harnesses, it is necessary to add on two, four, or six harnesses more, in order to give free access to the working of the heddles, as it does not do to have the heddles crowded on any harness, for such would cause the warp to chafe and break ; and as this would make slow weaving and unprofitable cloth for the manufacturer, it is always best to use a sufficient number of harnesses, and especially if the warp is inclined to go badly. The next in order is weave No. 2, which represents the plain broad cloth weave.

Weave No. 2.

1 2 3 4

The filling passes under three warp threads, and over the fourth in

succession, which throws $\frac{3}{4}$ of the warp on the face of the goods. When used with good filling, this weave makes a very strong and durable piece of cloth.

This, applied to a warp of all single yarn of a dark brown, with filling all double and twist of black and white, twisted twelve turns to the inch, makes a handsome piece of goods for whole suits, but should be finished on the wrong side, or, in other words, reverse the weave, which will be as weave No. 3—that is, calling the sinkers (as in

Weave No. 3.

1 2 3 4

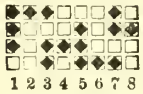
No. 2) risers, and the risers sinkers, which makes No. 3 weave. Sinkers denote harnesses down, and are represented by the blank squares in the weave, (or loom chain pattern,) while the risers denote harnesses up, which are represented by the black characters. The figures at the bottom of weaves denote the number of each harness in rotation.

Weave No. 4.

1 2 3 4

Weave No. 4 represents what is called the broken twill cassimere weave; it does not make a very fine face, but it comes under the head of plain weaving, and is used to a great extent in the manufacturing of plain melton cassimeres. This weave is produced from the common four harness cam loom, and will weave the four harness cassimere twill by drawing the warp in on what is called the skip shaft draw, which is 1, 3, 2, 4, with the harnesses numbered in rotation. This point will be brought up again under the head of Twills, where I shall endeavor to give it a more thorough explanation. The common coarse grays, for which there is such a demand, are mostly made from this weave, and a good rule for making these goods is as follows: Warp of 1,200 ends on the heavy side of 2 run, laid out 40 inches in the reed, (inside of selvage) which will require a No. 10 reed with three threads in a dent. Filling, $1\frac{3}{4}$ run, with 30 picks to the inch. This makes a piece of goods that handles well, and will finish 13 oz., which is the standard weight for this class of goods, although there are more that fall short of this weight than there are that come up to it.

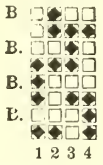
Weave No. 5.



Weave No. 5 represents one kind of a beaver weave, and requires 8 harnesses and 4 bolts of chain. A very good rule for a beaver made from this weave is as follows: warp of 2,280 ends of white yarn 4 run fine, drawn through a No. 14 reed, with 4 threads in a dent. This will make it a little over 40 inches in the loom. Filling should be all fine shoddy, of 2 run yarn, with 48 picks to the inch, and color in the piece black. It is best to use two shuttles, run on the pick and pick motion, to insure perfect goods.

It will be noticed in the above weave that the harnesses, numbered 2, 4, 6 and 8, have only one riser to three sinkers, which makes these for backing threads, while 1, 3, 5 and 7, have three risers to only one sinker; therefore these are for weaving face threads. For instance, dress a warp of 1 thread fine yarn, good stock, and 1 thread coarse yarn of poor stock, and draw in straight draft; it brings the fine yarn on harnesses 1, 3, 5 and 7, while the coarse is all on harnesses 2, 4, 6 and 8; this weaves that part of the warp made of poor stock on the back of the cloth, while that of the finer grade is woven on the face, which gives the goods the appearance of having all fine stock in the warp; the filling threads are all woven in alike—that is, one-half on the face, and one-half on the back—to each thread of filling, which makes it a substantial weave in the use of poor stock.

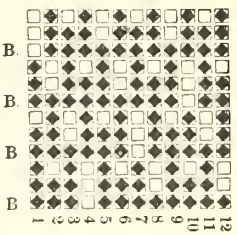
Weave No. 6.



Weave No. 6 represents what is used to a great extent in the manufacturing of plain faced, double and twist goods. It only requires 4 harnesses, but 8 bolts of chains. It may be observed that in this weave the harnesses operate alike; or, in other words, they each rise and fall the same number of times in succession, and that there are no harnesses employed in the weaving of backing threads as in the preceding weave, but there is a backing thread used in the filling which appears on the bolts as marked with the letter B on bolts 1, 3.

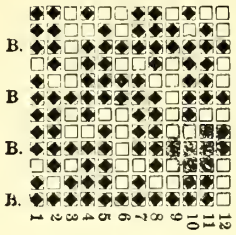
5 and 7, while bolts 2, 4, 6 and 8, are for the face thread to pass through on. A very good rule for making a double and twist cassimere with this weave is as follows: Make warp of 1320 ends of $2\frac{1}{2}$ run yarn for the single and the D. and T. to be made from $5\frac{1}{4}$ run yarn, doubled, and twisted 18 turns to the inch, dress the warp 4 threads black and light gray D. and T., and 2 threads single black. Filling same weight of yarn as the warp, and to run thus: 1 thread black and grey D. and T., 1 black; 1 black and grey D. and T., and 3 black. The D. and T. threads are to appear on the face, while the black threads weave in on the back, and one thread on the face to each pattern. Reed it 40 inches in the loom, and put in from 44 to 48 picks to the inch, which will make a very strong and durable piece goods, that will finish up 13 oz. and over, according to the number of picks.

Weave No 7



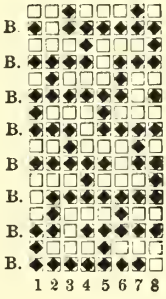
This represents the weave used in one class of goods called Moscow's, which are very heavy, and are intended for cloakings and overcoatings; it has a plain looking face, and looks well when nicely finished. It requires 12 harnesses and 12 bolts of chain; every third pick of filling is for backing, and appears on the bolts marked. This makes two threads weave on the face of the goods to one on the back; therefore, the face threads have to be a great deal finer than the backing. These goods are always woven white, of double width, and colored in the piece. A good rule for making them is this: warp 4800 ends of 4 run yarn laid out in loom 80 inches wide; this requires a No. 10 reed with 6 threads in a dent. Filling for face to be 5 run fine, of good stock, backing to be of coarse shoddy $1\frac{1}{4}$ run, put in 65 picks to the inch. This makes the cloth weigh from the loom a little over a pound to the single yard.

Weave No. 8.



Weave No. 8 is also another weave used in the manufacturing of this class of goods. It will be observed, in the preceding weave, that there are no harnesses employed in the weaving of backing threads in the warp, when in this weave it will be seen that the harnesses 3, 6, 9 and 12, weave backing threads, which is every third thread for backing, the same as in the filling, and for this reason (that these threads can be made of lower grade stock) this weave is better adapted in the weaving of heavier weight Moscow's than the former one.

Weave No. 15.

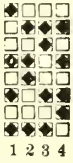


Weave No. 9.

Weave No. 10.

Weave No. 11.

Weave No. 12.



Weave No. 13.

Weave No. 14.

The weaves, 9, 10, 11, 12, 13, and 14, are all appropriate weaves in making medium weight goods, but weave No. 15 is designed to be used where a heavy weight is desired on goods of nice colors, that are to be finished close, and show a nice, smooth face. All the above weaves are applicable alike to all grades of plain cassimeres.

CHAPTER VI.

DOUBLE PICK AND BASKET WEAVING.

Weave No. 16.

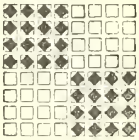
1 2 3 4

Weave number 16 represents what is called a double pick. It works on the same principle as a plain weave, but instead of two harnesses being employed, there are four, and 1 and 2 work in succession, with 3 and 4 twice over, which receives two picks of filling in a shade instead of one. It may be observed that by using two harnesses, and drawing two threads in a heddle on each harness alternately, that it produces the same pattern as four harnesses with two threads drawn into each heddle in succession.

Weave No. 17.

1 2 3 4 5 6

Weave No. 18.



1 2 3 4 5 6 7 8

The weaves 17 and 18 are what is designated as the basket weaves, and can be carried up to 12 harnesses, and even more in some instances. They can be woven with two harnesses on the same principle as No. 16, but it is not practicable on account of the crowding of the heddles.

Weaves of this class in general are calculated to be used with warps of one color and filling of another, and are used to a great extent in the combining of other weaves in fancy patterns.

An odd (but quite pretty) pattern can be produced from No. 18 made as follows. Warp 1200 threads, of three run yarn, dressed thus:

4 black
4 light gray } 3 times over.

8 black
4 light gray } 3 times over.
4 black }
8 light gray

64 threads in warp pattern.

Filling to be the same as warp in every respect, with 40 picks to the inch, warp laid out in the reed 37½ inches, which requires No. 8 reed with 4 threads in each dent. The filling chain and shuttle boxes should be set in such a manner that there will but one color appear in a shade. This will cause the shuttles to change alternately at the changing of each shade, except when the 8 threads of one color appear, and then one shuttle remains to fill two shades before changing.

There has been nothing as yet mentioned in this work about selvages, for the reason that in the preceding branch of "Plain Weaving" the selvage threads can be so arranged on the harnesses employed as to dispense with the selvage straps, or, in other words, harnesses; (although it is not practicable, for nice plain even selvages are preferable to any others on all grades of woolen cloths). But take it in this branch of weaving, it is essentially necessary to employ selvage harnesses, for it will be readily seen that in using those weaves, and all others of similar character, that have two or more picks in a shade, that if there were not selvage harnesses employed which would catch and retain every pick in succession, there would be nothing to draw the filling from the bobbin; therefore the shuttle would carry the same pick of filling back and forth every time, except, when the shade changed, and then one pick only would be retained, and this only in cases where there were an odd number of picks in a shade, such as three or five, which would cause the thread to be retained alternately on each side, at the changing of the shades. But with an even number, such as two, four, and six, none would be retained, for the reason that the shades change every time with the shuttle in the same box, or on same side of the loom, which would not permit of any weaving of the cloth, as there would be no yarn drawn from the bobbin, except what would naturally come off from the catching of fibres. This would be sufficient to cause snarls of filling to now and then weave in, which would be the extent of the weaving produced.

CHAPTER VII.

THE WEAVING OF TWILLS.

Twills differ in respect to the number of harnesses employed, and the manner in which the warp and filling threads are interwoven.

Next to plain and basket weaving, twills are the most extensive in their application to every branch of cloth manufacture ; they not only serve as a ground on which other decorations are woven, but they form purely, on their own principles, some of the most beautiful patterns which can be produced in the loom. The number of twills which may be produced by the varying of the drawing in plan, or the order of operating the harnesses, is very large. The first weave in order here is No. 19, which is called the three harness twill. This is

Weave No. 19

1 2 3

Weave No. 20.

1 2 3

sometimes called the blanket twill, from its being frequently employed in the weaving of blankets. Nos. 19 and 20 are the same weaves reversed ; 19 throws two-thirds of the warp on the back of the goods, and one-third on the face, while 20, throws two-thirds on the face and one-third on the back. No. 19 would be called a filling face, while No. 20 would be called a warp face, which is frequently used in the weaving of fine double and twist cassimeres, and is also used to a great advantage in large combination patterns.

Weave No. 21.

1 2 3 4

Weave No. 21 represents what is called the common cassimere, four harness twill, and is woven on the cam looms to a great extent. Probably this is used more than any other weave in the manufacturing of all grades of woolen cloths. Not only is it used to a great extent in the construction of a great variety of beautiful and pleasing designs produced from the fancy loom, but there can also be a large variety of

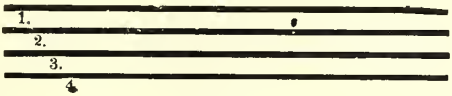
fancy figured stripes produced from it in the common cassimere cam loom, such as double picks, broken twills, right and left hand twills, etc., all of which can be combined and produced in one pattern on the cam loom.

In the weaving of any class of twills, it is necessary to have them run with the twist of the warp, in order to have the twill look full and even, otherwise they will look flat, and not appear above the face of the filling thread. For instance, in the above weave, which throws the same amount of warp and filling on both sides of the goods, it will be noticed that the twill on one side looks flat and not distinct. This, of course, is the wrong side, and the twill runs the reverse of the twist in the warp, while on the other side it will be seen that the twill looks full and distinct. This is the right side of the goods, and it will be seen that the twill runs with the twist of the warp.

Thus, if the warp is spun with a right hand twist, the twill should run to the right ; if spun with a left hand twist, it should run to the left.

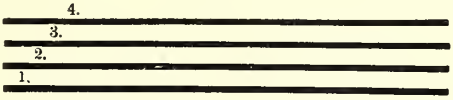
There are two ways of producing this effect—one is by the drawing in of the warp ; the other is by the hitching up of the treadles. In governing it by the warp, commence drawing in in the usual way, beginning on No. 1 harness, and drawing from you across the harnesses in succession; this will throw the twill one way, while beginning on No. 4 harness, and drawing towards you in succession, will throw it the other way. In governing it by the treadles, draw the warp in the former way, and hitch up the treadles according to figures Nos. 1 and 2. Let the straight lines represent the treadles, and the numbers the manner of hitching them up ; thus the number of a treadle must be hitched to a corresponding number of a harness. According to figures Nos. 1 and 2, it will be seen that No. 1 set of treadles is hitched up to the right, and No. 2 to the left.

Fig. No. 1.



FRONT.

Fig. No. 2.

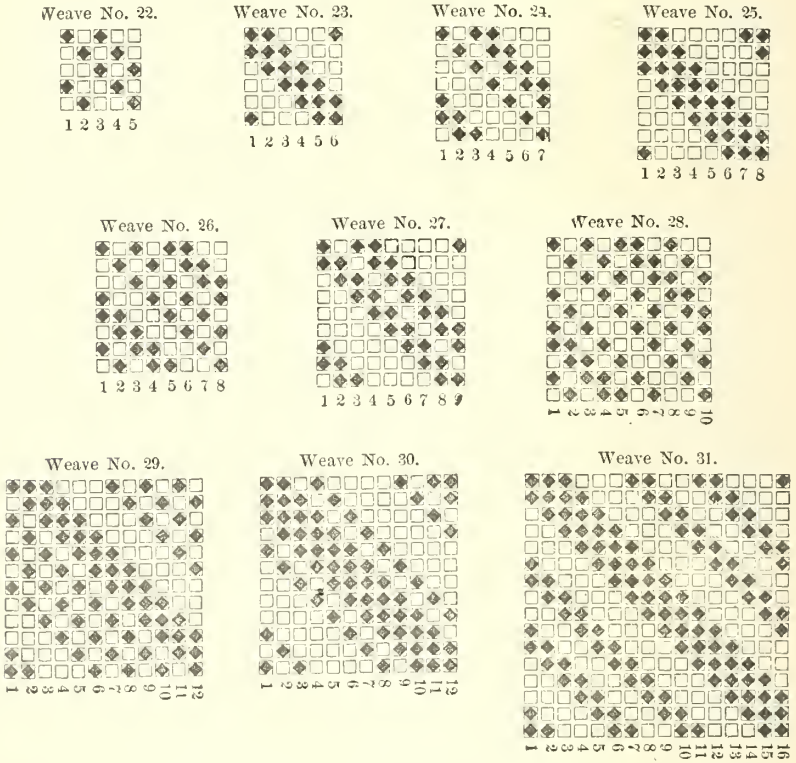


From these illustrations, the reader will be able to see and comprehend what is required for the changing of the twill, with the treadles.

For an illustration of the right and left hand twills, and combination of stripes spoken of, see *pickout* No. 1 on *plate* No. 1. It will be seen from this that the whole design is composed from the 4 harness cassimere weave (which is marked out at the upper left hand corner of the pickout,) and in order to produce it, it must be drawn in according to the drawing in draft as marked out, or in other words, as the figures read at bottom of pickout. This pattern can be made with an all black warp of 1460 ends of $3\frac{1}{4}$ run yarn, drawn in a $9\frac{1}{2}$ reed, 4 threads in a dent, with filling all a light gray of 3 run yarn, 42 picks to the inch, which makes a very pretty fancy stripe.

The stripes have to be formed in the weaving.

Below I present a few of the many fancy twills, although Nos. 23



and 25 do not go in that class, as they are simply the common 6 and 8 harness twills. There are a great variety of fancy twills, too many to be published in a work of this kind, as they would fill a large volume

alone, but these few are sufficient to show the reader the way they range, and are some of the most appropriate ones in use. A very pretty piece of goods can be made from weave No. 25, rule as follows : Warp 1200 ends drawn through a No. 15 reed, with 2 threads in a dent, which makes it 40 inches in loom, and gives a good chance for fulling the goods. Dress the warp as follows :

3 threads black, spun two run.
1 " blue and black, D. and T. each 4½ run, twisted 8 turns to the inch.
5 " black, 2 run.
1 " orange and black, D. and T. twisted 14 turns to the inch each spun 7 run, and a 4½ run thread of black twisted round the same 4 turns to the inch.

10 threads in pattern.

Filling pattern as follows :

3 threads black 2 run.
1 " red and green D. and T. twisted 18 turns to the inch, each of 7 run, with a thread of 4½ run twisted round the same 4 turns to the inch.
5 " black 2 run.
1 " black and white D. and T. with thread twisted around and made in same manner as other thread of twist.

10 threads in pattern.

Weave this with 32 picks of filling to the inch, and it makes a piece of goods that will finish about 13 ozs. with a melton finish, which makes a very pretty thing for whole suits, and very durable in service. A nice variety of patterns can be made in this manner by changing the threads of double and twist and using different colors in various ways, but the ground-work should remain the black yarn, as black is preferable with high colors in patterns of this kind.

Weave No. 23 makes a very pretty little twill, and is used to quite an extent in the construction of many beautiful designs. For an illustration of one, see *plate* No. 1, *pickout* No. 2. This shows a very pretty design, produced entirely from the six-harness twill. It may be observed that the pattern runs the same in both warp and filling, and in order to produce this it is necessary to build the loom chain the full length of the design, as marked off at the left hand side, which is the weave, and the warp should be drawn in as marked out at the

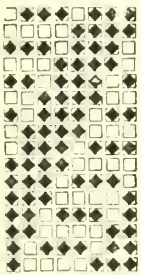
bottom. By taking the top of the pickout as marked thus, } { it makes a very nice combined herring-bone stripe, by drawing in same way as the original. This, of course, could be produced on the six harness cam loom. A good rule for making this pattern is as follows. Warp 1620 ends of a dark slate drab spun $3\frac{3}{4}$ runs, laid out in the reed 36 inches inside of selvage. This would require a 15 reed 3 threads in a dent; filling to be all a light silver drab of 4 run, with 50 picks to the inch, and give a close finish.

CHAPTER VIII

ON THE WEAVING OF DIAGONAL CORDS

From the preceding examples of plain and fancy twills, the weaving of diagonal cords will be more easily understood. They do not, however, take as extensive a range in the general production of cloths as the twills do, at the present time, but are used to a greater advantage in the weaving of heavier weight goods, for the reason that they are more adapted to the application of backing threads in both warp and filling, and also have a larger quantity of floating threads. Weave 32

Weave No. 32.



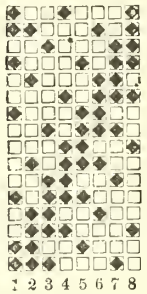
1 2 3 4 5 6 7 8

shows a good representation of a cord. It will be seen that, in the weaving of the filling, every other thread acts as a backing, while in like manner one appears on the face of the goods, and the largest float in the filling is the face thread, which is 4 up and 4 down alternately.

In the warp it will be seen that the cord is formed by the floating of seven warp threads over the filling, in succession, while the weaving between the cords is done by the raising of three warp threads in succession. Therefore, it will be seen that in the operating of the warp threads, that 10 are raised and 6 dropped in succession to every 16 threads of filling. This causes $\frac{5}{8}$ of the warp to be woven on the face, while only $\frac{3}{8}$ are woven on the back, and $\frac{3}{8}$ of filling woven on the face to $\frac{5}{8}$ on the back, which makes a warp face piece of goods, and

as a general rule cords range in this manner, there being a larger quantity of warp on the face than of filling.

Weave No. 33.

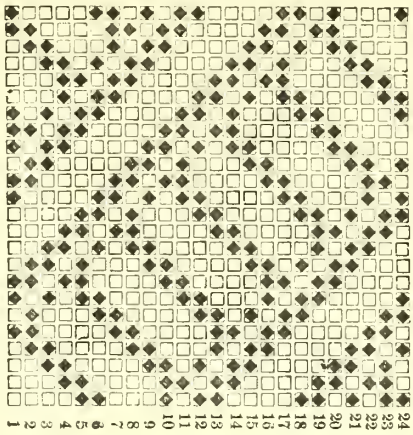


Weave 33, however, shows a cord that has a *filling* face, as the largest quantity of the warp is thrown to the back, while that of filling appears on the face. This makes a pretty cord for fine light weight goods, for which a good rule is as follows : Warp 1600 ends of 4 run yarn, all black, drawn into a No. 10 reed, with 4 threads in a dent.

Filling a dark steel mix of $3\frac{1}{2}$ run yarn, with 40 picks to the inch. This will make a pretty pattern for a whole suit, or any part of one.

For an illustration of a nice large cord to be used in weaving worsted coatings, see *Plate* 1, *Weave* No. 34, and *also Weave* No. 35, of same *Plate*, which is formed from the first 24 bolts (at the top) of weave 34, but is repeated to 48 bolts in order to show the manner in which the cords unite, which makes a very pretty pattern. The warp threads in both patterns will be observed to have a float of nine threads where they form the cord, and in weave 34 the filling-thread for face has a float over seven warp threads, while the backing threads float under six warp threads at the most ; but in weave 35, the filling thread float on the face is woven in at the center by the rising of one warp thread, while the backing remains the same. This floating thread in the other weave can be changed as in this, which would be an improvement if using coarse yarn, and also weave the float threads of warp in at the center, which would cause them to weave the cord thus: 4 up 1 down 4 up, in succession, instead of being 9 up in succession.

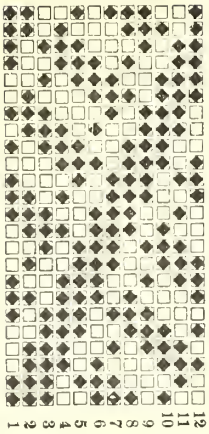
Weave No. 36.



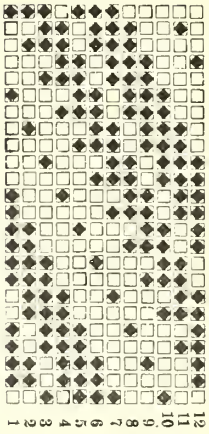
Weave 36 represents another very handsome fancy cord, which is intended for worsteds, and from this same weave several beautiful patterns can be accomplished. It is also appropriate for the weaving of fine goods made from common woolen yarn. For an illustration of the different patterns that can be made from this one, see *Plate* No. 2, *Pickout* No. 3, which shows a very pretty diamond, and to weave the same, use the half of the *Pickout*, which is marked off "*the weave*," and draw in according to the drawing in draft, allowing the figures at left hand to represent the harnesses. To make a herring-bone stripe from this design, use only the top half of the present weave (which would be the 24 bolts), and draw in the same as for the diamond figure. A very good rule for using this weave is as follows : Warp of 2,400 ends of 5 run yarn drawn through a No. 11 reed, 6 threads in a dent. Filling $5\frac{1}{4}$ run, 80 picks to the inch.

Another very large pattern for a diagonal cord is weave No. 37 on same plate, which requires a 48 harness loom to weave it, as it cannot be reduced any. This weave is made similar to No. 36, only greatly enlarged, and there are two rows of figures between cords instead of one, with a little more float in both the filling and warp threads.

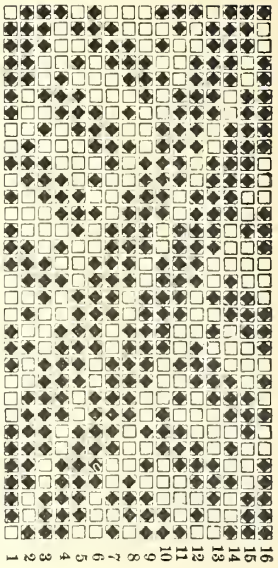
Weave No. 38.



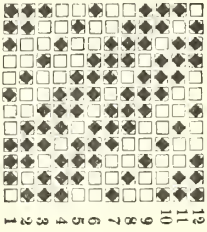
Weave No. 39.



Weave No. 40.



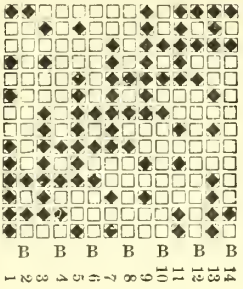
Weave No. 41.



The weaves 38, 39, 40 and 41 are other specimens of nice cords; 38 and 40 might be classed as fancy cords. It may be seen that these two weaves are very much alike; all the difference is that 38 has a single cord, while 40 has a double cord, which requires 4 harnesses and 8 bolts of chain more than the other to make it. Weave 41 is a nice specimen for fine goods, and will make a smooth and even cord, while the others are more adapted to the weaving of coarse and heavier weight goods, without using any backing threads. But for the manufacturing of heavy weights, designed for over-coatings,

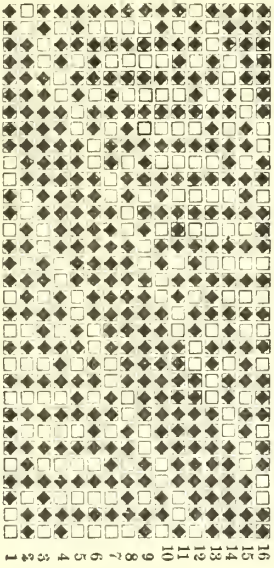
weaves 42 and 43 are more appropriate. It will be observed that in weave 42 the harnesses 2, 4, 6, 8, 10, 12 and 14, weave a backing to

Weave No. 42.



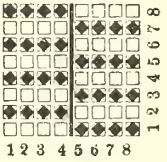
the warp, and that every other pick of filling is a backing thread, and as the largest quantity of both warp and filling are thrown on the back of the goods, it makes a nice weave for using waste and other inferior stock, which can be worked up to a good advantage.

Weave No. 43.



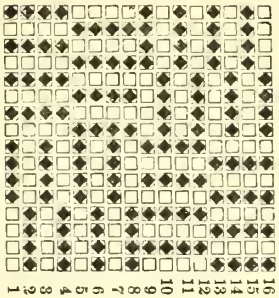
The weave 43 has no backing in the warp, but has a very heavy one in the filling ; it will be seen that the warp threads float over nine filling threads in succession, which forms the cord, and there is also the same float in the backing thread every alternate pick, and for the reason of there being so much floating of threads it will be necessary to use a large number of ends in the warp, and put in all the filling possible in order to have a firm piece of cloth ; otherwise the goods would have a very loose feel, which is called slazey. Such goods are not very profitable to wear, and neither are they very easily sold, except to those who are not judges of this class of goods. In addition to the Diagonal cords, there is another kind known as the straight cord, which will run length-wise and cross-wise of the cloth at right angles, if desired, or either way single.

Weave No. 44.



Weave No. 44 shows a specimen weave for this kind of a cord. It will be seen that it is simply a plain weave, with 4 threads drawn on one harness, or 4 harnesses to operate alike, according to the weave, as marked through the center. Each four harnesses form a cord by themselves, warp-ways; but if required to have the cord run filling-ways, then it would be only necessary to turn the weave around so that No. 1 harness, as it stands now, would be No. 1 Bolt of chain at the top, and the top bolt as now would be No. 8 harness, according to the figures at the right hand side of the weave, which would indicate the harnesses, while the figures that are at the bottom now would be on the left hand side, and indicate the numbers to the bolts of the loom chain. This class of cords are often used separately from any other weave, in the manufacturing of many nice patterns, but is used to a greater extent in combinations with other weaves. When used separately, such patterns are often called *Basket ribs*, especially if combined like weave No. 45, which will be spoken of further on in the work. I shall drop this subject, and also that of diagonal cords, here, believing that the reader has information enough before him to

Weave No. 45.



give him a good idea of this branch of weaving, although there will be other illustrations brought up that will also help in more fully understanding these.

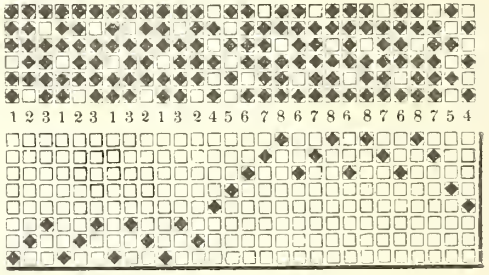
CHAPTER IX.

THE WEAVING OF VARIOUS KINDS OF RIBS.

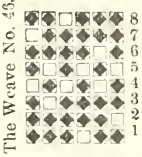
Taking the various kinds of ribbed weaves combined, and they probably form nearly as great an assortment of beautiful fancy patterns as any other branch in the art of weaving—although at the present time of writing there are not as many ribbed patterns in style as have been heretofore. The three principal kinds of ribs are known as the Plain straight rib, the Diagonal rib, (which runs bias with the cloth,) and the Basket rib, which sometimes goes under the name of "cords." With these ribs, patterns of various figures can be formed, but as there are almost always a large number of floating threads in this class of weaves, it is generally necessary to use some simple specimen of a plain weave, in connection with the rib weaves, for the purpose of weaving the ribs together, and dispensing with so many long, floating threads. In some weaves of this class the backing threads of filling float under as many as 20 warp threads, and in some instances even more, while the warp threads will float over as high a number as 15 or more filling threads. Such, however, are not profitable weaves to use; and no manufacturer ought to allow them used inside of his mills, unless he does not care how the goods are made.

As a general thing, most all ribs can be reduced, more or less, and be woven on fewer harnesses than the original draft or pickout has represented in it, and as such pickouts in all *ordinary* ribs do not run up to an extensive size, it may be well to place a few of them here, and not have to refer to the plates for them. The first here represented is *Pickout* No. 4, and is that of a nice fine rib, which is woven herring-bone style.

The Pickout No. 4.



The Weave No. 43.

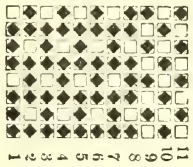


The Drawing in draft, 28 threads in pattern.

It will be seen that to weave this pattern by drawing through the harnesses a straight draft, it would require 28 harnesses, but by reducing according to the figures as marked at the bottom of pickout, it can be woven on 8 harnesses by drawing in like the draft, which reads the same as the figures are marked down. This style of pattern is intended for all one color of yarn in both warp and filling. Bolts 1, 3 and 5 are for backing threads, of a great deal heavier weight than that for the face.

To use a warp of 1890 ends, it will produce 5 ribs to the inch, as every 14 threads of the warp produce one rib, but there are two ribs in the full pattern of weaving.

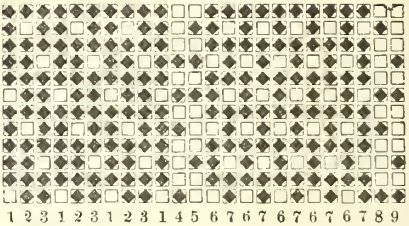
Weave No. 47.



Weave 47 represents another very pretty little rib. It can be woven by using the cross draw on four harnesses, but as there are only 11 threads in the full pattern, it is best to use 11 harnesses, and draw in straight draft, as the weaver is less apt to make mistakes in weaving on a straight draft than when on a cross draft, especially if they have a breakout in the warp, which is nothing new to occur in any weave room.

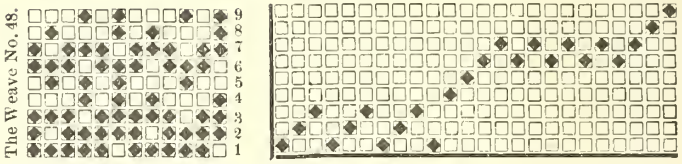
A very good rule for this pattern, and have 7 ribs to the inch, is as follows : Warp 2080 ends of $4\frac{3}{4}$ run yarn, dressed 8 threads light drab, 3 threads dark slate ; draw through a No. 13 reed, 4 threads in a dent, which will make it 40 inches wide in loom inside of selvage, and will give it a good chance for fulling ; for ribs generally need much fulling to make them handle well, and also to throw the rib up full and round. Filling for face to be spun 5 run (of same color as warp) and for the backing 3 run ; put in all the picks to the inch it will take without extra straining on the warp, and this will make a good firm piece of goods, that looks well made up into pantaloons.

Pickout No. 5.



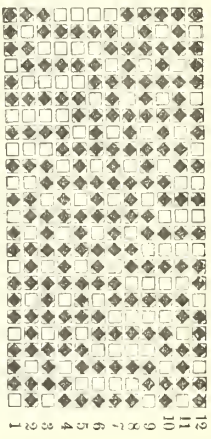
1 2 3 1 2 3 1 2 3 1 4 5 6 7 6 7 6 7 6 7 6 7 8 9

The Weave No. 48.



Weave 48, with Pickout, shows a rather large rib combined with a smaller one, although it would not be thought so by looking at the pickout, as that shows an equal number of threads in each rib ; but by close observation it may be seen that in one half of the pickout the warp threads float over 5 filling threads in succession, while in the other half they float over but 3 threads in succession ; therefore this rib weaves the tightest in both filling and warp, for it will be seen, that the face filling threads weave in plain, while in the other rib, the face filling weaves in a three harness twill, and at the same time the backing threads weave in alike in both, which causes the rib with the plain face to full up small but round, while the other looks more flat and broader, which gives it the appearance of being as large again. This will look well made with about $5\frac{1}{2}$ ribs to the inch.

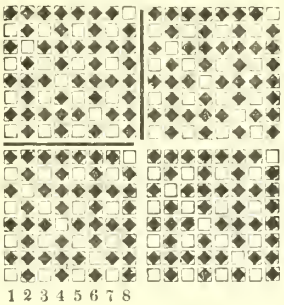
Weave No. 49.



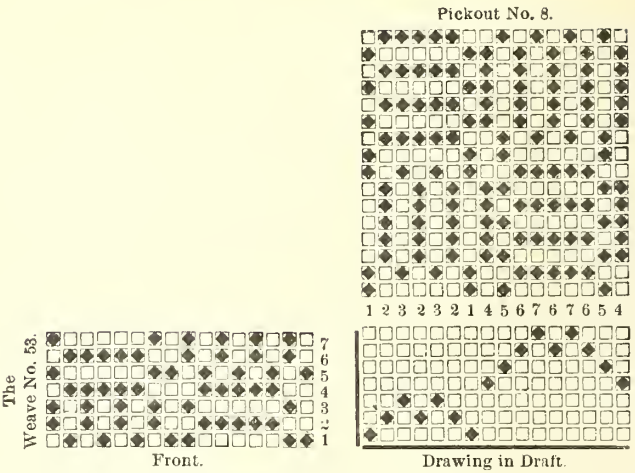
Weave No. 49 represents a diagonal rib, and a very good one for coatings. For an illustration of a herring-bone rib and a straight rib combined, see *Plate* No. 2, *Weave* 50, and *Pick-out* No. 6, which is a very pretty pattern. It may seem to some to be too large, there being 120 threads in the pattern, but by using a warp of 2,000 ends, it would only show the pattern to be a little over $1\frac{1}{2}$ inches wide when finished, which is not so large as a great many patterns of this style.

Pickout No. 7, with weave, shows another very handsome fancy rib of 112 threads in the pattern, which should be made with all black yarn. It will be seen from the pickout that in each half of the pattern the ribs run at right angles from each other, and that the space between each is woven plain, which causes an odd but pretty appearing figure.

Weave No. 52.



Weave 52 is another one of the diagonal ribs, and a very peculiar weave it is ; the corner marked off is the full size of the weave, but I have repeated it four times in order to better show the pattern. It will be seen that every alternate thread in both the warp and filling is a backing thread, and that the warp and filling threads both weave in alike, so that it does not make any difference which way the loom chain is turned, it will produce the same weave.



Pickout No. 8 shows another very odd and peculiar weave, which produces little small raised spots or ribs, and is calculated for worsteds or imitations of worsteds. A good rule for this pattern is as follows : Warp 2,000 ends of fine black worsted, drawn through a No. 14 reed with 4 threads in a dent ; filling same as warp, with 60 picks to the inch. *Pickout* No. 9, with weave, (*Plate* No. 3) is a good illustration of a nice large basket rib, of 64 threads in the pattern.

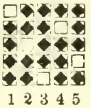
Having already occupied several pages on the subject of ribs, it may be well to leave it for the present, for I have no doubt the reader will understand by this time the principle of this class of weaving, sufficiently to enable him to weave correctly not only the patterns laid down here, but also others of his own designing.

CHAPTER X.

MISCELLANEOUS WEAVES.

The few weaves following are some of the principal ones that have been excluded from the preceding Chapters, and as the most of them are of great importance in the manufacturing of different grades of woolen cloths, it would not be doing justice to the reader to omit them entirely from this work.

Weave No. 55.



1 2 3 4 5

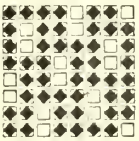
Weave No. 55 represents that of a common five-harness Doeskin, which is produced on nearly all cam looms, and is used to a great extent in the production of fine cloths.

Weave No. 56.

1 2 3 4

Weave No. 56 represents that of *double cloth*, so called on account of its being capable of weaving two pieces of goods at the same time, one above the other. It is also used to a great extent in the production of very heavy weight goods. It is frequently used for weaving 6-4 blankets on $\frac{3}{4}$ looms, as it produces the original flannel weave in both pieces, and weaves them together at each side, so that in the loom, or as it comes from the loom, the pieces present the appearance of a bottomless bag, and by cutting one side open, it gives you a double width blanket instead of single, as it has the appearance of being when weaving.

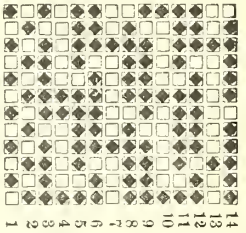
Weave No. 57.



1 2 3 4 5 6 7 8

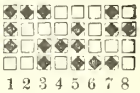
Weave No. 57 represents one kind of a Doeskin weave to be made on 8 harnesses, which is a very good one. For a handsome pattern made from this particular weave, see *Pickout* No. 10 on *Plate* No. 3, which will show the manner of dressing the warp, and is made of 5 run yarn for the single, and 8 run for the double and twist, twisted 16 turns to the inch, 2,160 ends in warp, drawn through a 15 reed, 4 threads in a dent, filling $5\frac{1}{4}$ run of the light drab, with 65 picks to the inch. It will be seen, from the drawing in draft, that the pattern forms a fancy herring-bone stripe.

Weave No. 58.



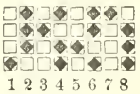
Weave 58 represents what is called a Catlin weave, as it is used in weaving a class of goods called the Catlin stripes, which are heavy goods, and harnesses 1 and 2 weaving plain, it forms a crease, while the other 12 harnesses weave in every third thread of both warp and filling as a backing thread, which causes the cloth, when fulling, to draw this crease up so narrow that when finished it has the appearance of being cut with some sharp tool.

Weave No. 59.



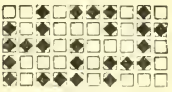
Weave No. 59 represents an 8-harness weave, used in making a class of goods that are called the Mansfield Beaver, and a good rule for making them is as follows: Warp 2280 ends of 4 run yarn; draw into a No. 14 reed with 4 threads in a dent; filling all fine shoddy of $1\frac{3}{4}$ run, with 48 picks to the inch. Weave white, and color in the piece a blue black.

Weave No. 60.



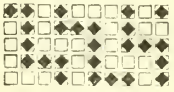
Weave No. 60 is another weave used for the same class of goods as above.

Weave No. 61



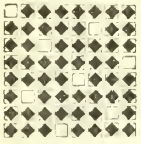
Weave No. 61 represents a weave used in the manufacturing of the goods called Bennington Beavers, and can be made similar to the Mansfield Beavers.

Weave No. 62.



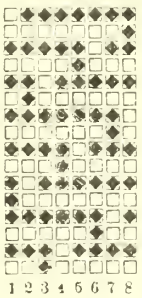
Weave No. 62 is another one for Benningtons, sometimes called the Bennington Twill.

Weave No. 63.



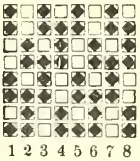
Weave 63 represents the weave used in making a class of goods called Geneva goods. The weave is also called an 8-harness Doeskin, and sometimes designated as buckskin, as it resembles very much the original Doeskin weave.

Weave No. 64.



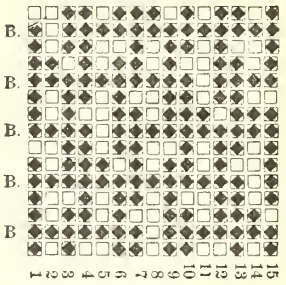
Weave No. 64 represents that of a heavy Fur Beaver, and is a good weave to work up lots of card waste and shoddy into the filling.

Weave No. 65.



Weave No. 65 represents the weave used in making the class of goods called the Granite goods. It will be seen, upon close observation at the weave, that the face filling threads weave in perfectly plain, while the backing threads are wove in in such a manner as to cause a fine diagonal crease.

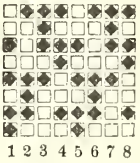
Weave No. 66.



Weave No. 66 is for a heavy doeskin beaver, and a good rule for making the same is as follows: Warp 2,400 ends of 5 run yarn, drawn through a No. 12 reed, with 5 threads in each dent. Filling $5\frac{1}{4}$ run for the face, and $1\frac{3}{4}$ run for the backing. Put in 80 picks to the inch, and color in the piece.

The backing threads are to appear on the bolts of chain, marked B. The above rule makes a very good piece of goods.

Weave No. 67.



Weave No. 67 represents the principal weave used in the manufacturing of a fine grade of tricots, which are usually woven white, and colored in the piece a black, navy blue, blue black, or a dark seal brown.

For Weave 68, see *Plate* No. 4, which is a beautiful fancy twill, forming a diamond square, and is composed entirely from the four harness cassimere twill. It looks nice made in worsted or of common yarn.

Weave No. 69 represents another nice pattern, formed from the same cassimere twill ; of the two, this is the prettiest pattern when made up.

Weave No. 70 represents a pattern of combined weaves, and forms little diamonds of double pick in the center of each figure.

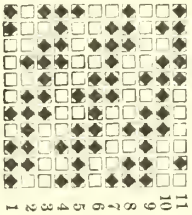
Weave No. 71 represents another fancy square, diamond shape, composed of different size twills.

All the above designs, which are on *Plate* 4, are calculated to be for warps of one color, with filling the same, as they look far more tasteful than when dressed with several colors combined, although a warp of one color, with filling of another, looks quite pretty.

Weave No 72.

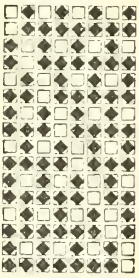
Weave No. 72 represents a very useful little weave for making double and twist goods, when a small twill is desired to be shown. This makes a firm and durable piece of goods, as it will be seen that every alternate pick of filling acts as a backing thread, although it does not float under more than three threads at one time.

Weave No. 73.



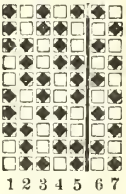
Weave No. 73 is a very peculiar weave, there being 11 harnesses and 11 bolts of chain to form it, and when used on an all-double and twist warp, with all-single filling, it throws up a very full and even diagonal cord, that finishes up nicely.

Weave No. 74.



Weave No. 74 represents a diagonal rib, sometimes called a diagonal tricot, on account of the furrows resembling those of a tricot. A good rule to make this is as follows: Warp 2100 ends of $4\frac{1}{2}$ run yarn, drawn into a No. 14 reed, with 4 threads in each dent, filling for face 4 run, and for backing 2 run; put in 54 picks or over to the inch.

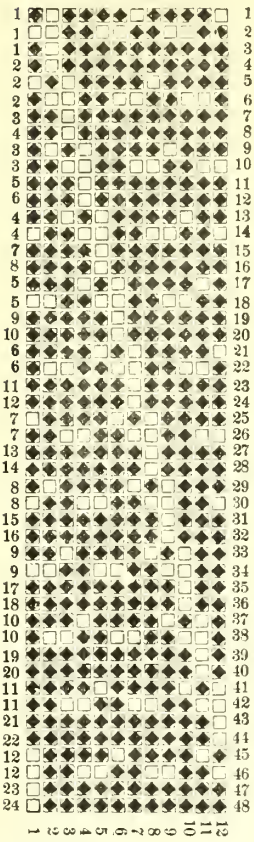
Weave No. 75.



Weave No. 75 is a good weave for weaving striped goods with a warp of all one color. It may be seen that this is two weaves combined, which is a 5 harness twill and a two harness plain weave. A very good stripe is made from it thus: Warp 1200 ends of all black and white D. & T. to be $1\frac{3}{4}$ run when twisted; draw into a No. 12 reed; warp drawn in thus: 15 threads on first 5 harnesses, and 2 on harnesses 6 and 7, &c. Then reed it thus: all the warp drawn on first 5 harnesses to be reeded 3 threads in a dent, and all the warp drawn on harnesses 6 and 7 to be reeded 2 threads in a dent. This will make the warp little over 35 inches in the loom. Filling 2 run of all black yarn, which causes a black stripe to appear where the two threads are in a dent, which are woven, the plain weave with the 2 back harnesses, put in 36 to 40 picks to the inch.

Various sized stripes can be made from the above weave, and as it does not require to have the warp striped, it becomes very useful in many instances, for the stripe will finish up about as perfect as though the warp was striped, and it looks fully as well.

Weave No. 76.



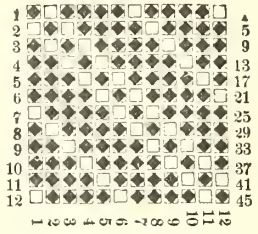
Weave No. 76 represents a peculiar kind of a diagonal. It neither shows a twill nor a cord, but has a smooth and even face, while at the same time there is a fine line or *crease* running biassed with the goods, which gives them a rich appearance. A good rule for using this weave is as follows :

Warp 2500 ends of first quality yarn, spun $5\frac{1}{4}$ run, and reeded in a No. $10\frac{1}{2}$ reed, with 6 threads in each dent, which will make it about 40 inches in the loom. Filling spun for the face threads 6 runs, and for backing $3\frac{1}{2}$ run, with 76 to 80 picks to the inch, which will make the goods come from the loom about 13 ozs. Weave white, and color in the piece a chrome black, and finish up a good high finish. It will make an uncommonly nice piece of goods for dress suits.

The above being such a peculiar weave, it may be well to show to the reader the manner of its construction, which, as will be seen, is from the arrangement of the bolts (or bars) of three separate weaves ; and to make the illustration more fully understood, we will number the bolts of the chain (commencing at the top) from 1 to 48 on the right hand side.

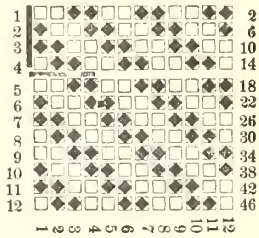
Now we will take bolts numbered, 1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, and 45, and number them on the left hand side of the chain, from 1 to 12 in rotation, and set them down on designing paper. We have the following weave No. 1, which, it will be seen, is a 12 harness diagonal cord.

Weave No. 1.



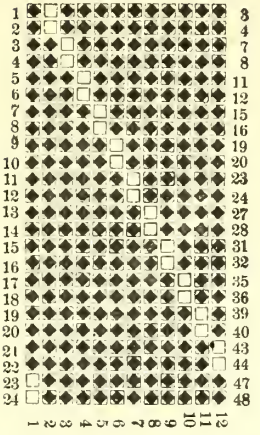
Now we will take the bolts numbered 2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, and 46, and number them from 1 to 12 in rotation, and set them down on the designing paper ; we have the following weave No. 2, which is simply a 4 harness cassimere twill.

Weave No. 2.



Now in like manner take the remaining bolts, which are numbers 3 4,—7, 8,—11, 12,—15, 16,—19, 20,—23, 24,—27, 28,—31, 32,—35, 36,—39, 40,—43, 44, and 47, 48, and we have the weave No. 3, which, it will be seen, is a diagonal cord, but *is not a practical weave to be used alone,* for every thread of warp floats over 22 threads of filling, which is too

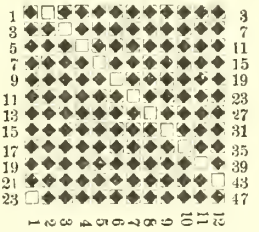
Weave No. 3.



much of a float to be used warp-ways in woolen weaving; but it will be seen that this weave has two picks of filling in each shade, which is done to help form the crease in the original weave, and also to have a backing thread for every face thread in the goods, as this is the weave for the backing, while the Weaves No. 1 and 2 weave the face of the goods.

Now, by taking every alternate bolt of this backing weave, which would be numbers 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, and 47, we have the Weave No. 4, which is such that it can be in many instances

Weave No. 4.



used by itself, but is the more appropriate to be used in connection with other weaves, as in the above case.

It may be found by a close observation that many of the plain and fancy diagonals are composed in a similar manner as the preceding diagonal that has been here fully explained; and it is hoped, from these explanations, that the reader may be able to take various twills and cords, and with them combine many nice diagonals that may be of great use to him in the weaving of various beautiful patterns.

CHAPTER XI.

COMBINATION OF WEAVES

The combining of weaves is one of the most important branches in the whole course of the fancy weaving department; and, as it is somewhat complicated, I shall endeavor to show up a number of very nice designs, which, it will be seen, are composed of two or more weaves, some of which cannot be reduced to weave on the ordinary 24-harness looms, but none but what can be made on a 48-harness loom. I might occupy more space, and use up more time, in writing out explanations, and giving the rules for making cloth from every pick-out and weave published herein; but, as it would add to the cost of the book, and believing that not one weaver or designer would ever use the weaves just as I would lay them down, it is unnecessary, as the pick-outs on every plate are laid out so plainly, and the figures at the bottom showing the manner they are reduced, and also the drawing in draft, that any person of ordinary intelligence who knows the principles of the loom, and understands anything about patterns, ought to be able to perceive the manner each pick-out is composed of the separate weaves, and to be able to take from them such parts as he wants, and combine the same with other weaves he may wish to use, and get them in a correct form, without any further details in writing them out.

There will be found, on the different *plates*, pick-outs composed of various weaves, and no imaginary ones are inserted. They comprise weaves with and without backings, some of which are very simple, and others of a somewhat complicated design. There will also be seen some weaves that cannot be reduced, which will require a 48-harness loom to use them. Such weaves are simply shown to help the reader form new ideas, and be able therefrom to compose weaves of his own designing. Several of the largest and most complicated pick-outs shown on the plates are of late designs, of foreign make, and it is hoped that they may be appreciated, as they certainly show for themselves that they must have been produced by a master-hand in the art of fancy weaving.

CHAPTER XII.

TABLES AND RULES.

Spinner's Table, Showing the Number of Grains to 50 *Yards of Yarn from* 1 *to* $12\frac{3}{4}$ *Runs.*

Runs.	*Grains.*	*Runs.*	*Grains.*
1	218.75	7	31.25
$1\frac{1}{4}$	175.	$7\frac{1}{4}$	30.17
$1\frac{1}{2}$	145.83	$7\frac{1}{2}$	29.165
$1\frac{3}{4}$	125.	$7\frac{3}{4}$	28.225
2	109.375	8	27.34
$2\frac{1}{4}$	97.22	$8\frac{1}{4}$	26.515
$2\frac{1}{2}$	87.50	$8\frac{1}{2}$	25.735
$2\frac{3}{4}$	79.995	$8\frac{3}{4}$	25.
3	72.915	9	24.305
$3\frac{1}{4}$	67.305	$9\frac{1}{4}$	23.645
$3\frac{1}{2}$	62.50	$9\frac{1}{2}$	23.025
$3\frac{3}{4}$	58.33	$9\frac{3}{4}$	22.435
4	54.685	10	21.825
$4\frac{1}{4}$	51.47	$10\frac{1}{4}$	21.34
$4\frac{1}{2}$	48.61	$10\frac{1}{2}$	20 83
$4\frac{3}{4}$	46.05	$10\frac{3}{4}$	20.35
5	43.75	11	19.885
$5\frac{1}{4}$	41.665	$11\frac{1}{4}$	19.44
$5\frac{1}{2}$	39.75	$11\frac{1}{2}$	19.02
$5\frac{3}{4}$	38.04	$11\frac{3}{4}$	18.61
6	36.455	12	18.225
$6\frac{1}{4}$	35.	$12\frac{1}{4}$	17.815
$6\frac{1}{2}$	33.65	$12\frac{1}{2}$	17.50
$6\frac{3}{4}$	32.455	$12\frac{3}{4}$	17.155

This table is very convenient for finding the weight of double and twist, when two or more threads are twisted together; for instance,

suppose it is required to make a three-ply thread of twist from the following threads. Example :

1 thread of 9 run, 24.305 grs.
1 " 11 " 19.885 "
1 " 7 " 31.25 "

75.440 " = 3 runs.

By referring the sum 75.44 grains to the table, it will be found to compare the nearest to 3 runs ; but as this is making the yarn lighter than it figures, and it being subject to taking up more or less in the twisting, it will be near enough for practice to call it $2\frac{3}{4}$ runs. For a more *exact* calculation, the table could be made out for $\frac{1}{8}$ runs or $\frac{1}{16}$ runs.

A Table of Relative Lengths of Worsted and Woolen Yarns.

300 yds. Single Woolen Yarn.....1 cut.
1600 yds. " " " .....1 run.
560 yds. " Worsted " .....1 number.

Comparison.

28 Cut Yarn.....8,400 single yds. to 1 lb.
$5\frac{1}{4}$ Run " .....8,400 " " " 1 lb.
No. 15 Worsted.....8,400 " " " 1 lb.

One pound 2-ply 36's worsted yarn contains 10,080 yards
" " " 40's " " 11,200 "
" " " 45's " " 12,600 "
" " " 50's " " 14,000 "
" " " 60's " " 16,800 "
" " single 36's " " 20,160 "
" " " 45's " " 25,200 "
" " " 50's " " 28,000 "
" " " 60's " " 33,600 "

Or nearly 20 miles of thread !

Rule for Ascertaining the Weight of Warp and Filling in a Single Yard of Flannel.

Divide the number of ends in the warp by the number of run fine the warp is spun, and the quotient is the number of ounces of warp

to the yard, by pointing off two figures at the right. Thus, for example, suppose you had a warp of 2,100 ends of 5 run yarn, how many ounces are there? Example:

Runs | 2100 ends in warp
5 ⌋ ——
4.20 = 4⅕ ozs. warp to the yard.

How to find the weight of filling to a yard of flannel, multiply the number of filling threads in an inch by the number of inches the warp is laid out in the reed, and then proceed same as with warp Thus, for example, warp laid out in the reed 40 inches wide, with 55 picks to the inch, how many ounces are there, supposing the filling is spun 5 run like warp?

Example.

55 X 40 = 2200 ÷ 5 = 4.40 or 4 2-5 ozs. of filling to the yard of flannel; now add the two sums together, and you have the weight of stock to a yard, warp 4.20 ozs.

Filling 4.40 "

Total 8.60 "

Now, in these calculations, there has been nothing said about selvage, and as the warp takes up more or less in weaving, it is well to calculate from ½ ounce to an ounce and a half, according to the amount of selvage used and the kind of weave employed in the weaving of the goods.

How to Make a Yarn Table for 50 Yards, or Any Other Number.

Take 1,600 yards of *one run* yarn, and it will weigh one pound, *(Avoirdupois)* or 7,000 grains, and divide it by 50 (or any number of yards you wish for a weighing). Then divide 7,000 by the above quotient, and the quotient *obtained* will be the number of grains in 50 yards of one run yarn.

Thus, 1,600 ÷ 50 = 32.
7,000 ÷ 32 = 218.75 grains.

Then take the 218.75 grains for a dividend, and the *weight* of a weighing for a divisor, and the quotient will be the number of *runs*.

Thus, for example, supposing the weighing weighs 35 grains,

218.75 ÷ 35 = 6.25 runs, or, 6¼ runs.

The above table is to facilitate finding the weights of yarn, where you have no printed weights or tables to refer to.

For the Manufacturer and Operative.

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AND

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For the benefit of those requiring Samples Dissected, I have published the following

PRICE LIST.

For *ordinary* samples, requiring—

From	4	to	48	bars	of	chain,	$1.00	each.
"	48	"	60	"	"	"	1.50	"
"	60	"	72	"	"	"	2.00	"
"	72	"	84	"	"	"	2.50	"
"	84	"	96	"	"	"	3.00	"

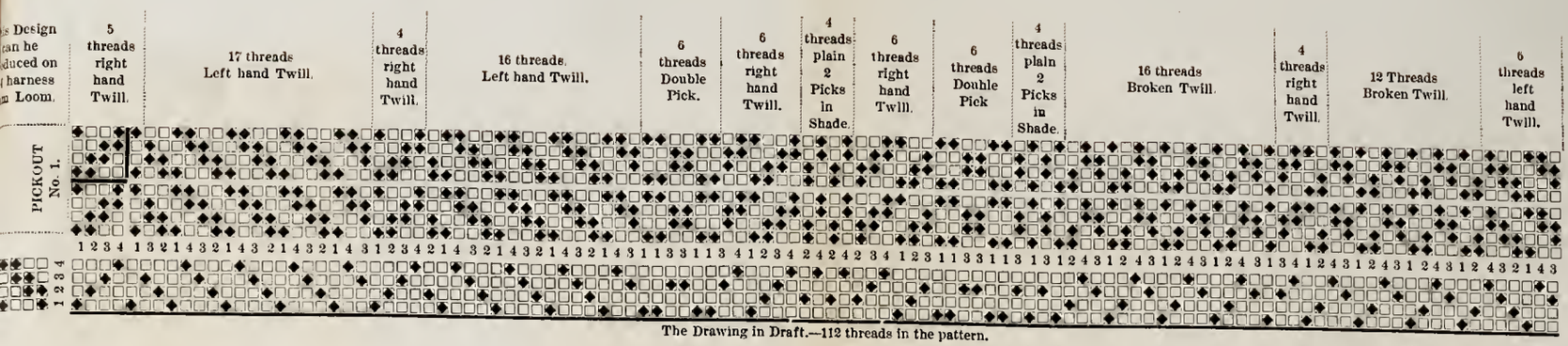
And for each additional bar thereafter, *Three Cents.*

All samples sent to me for the Weaves and Drafts, and instructions for making the same, will be promptly attended to, and returned at the earliest possible time.

A. A. BALDWIN,

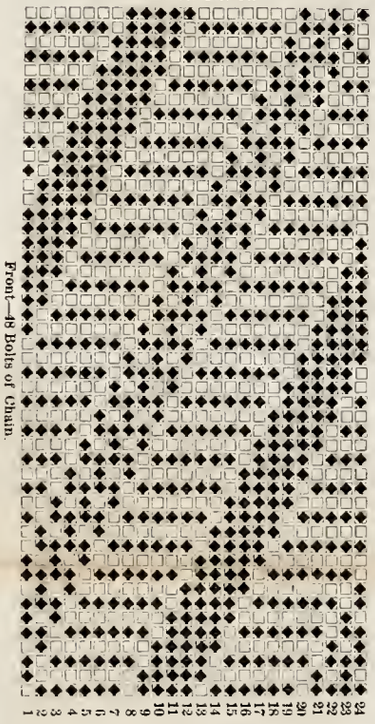
Brasher Falls,

ST. LAWRENCE CO., N. Y.



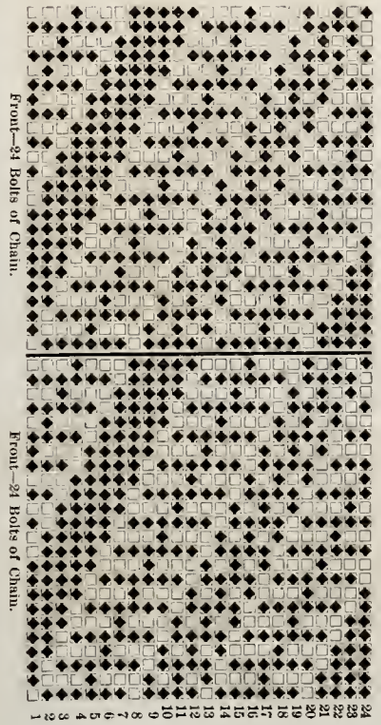
The Drawing in Draft.—112 threads in the pattern.

WEAVE No. 34.



Front—48 Bolts of Chain.

WEAVE No. 35.

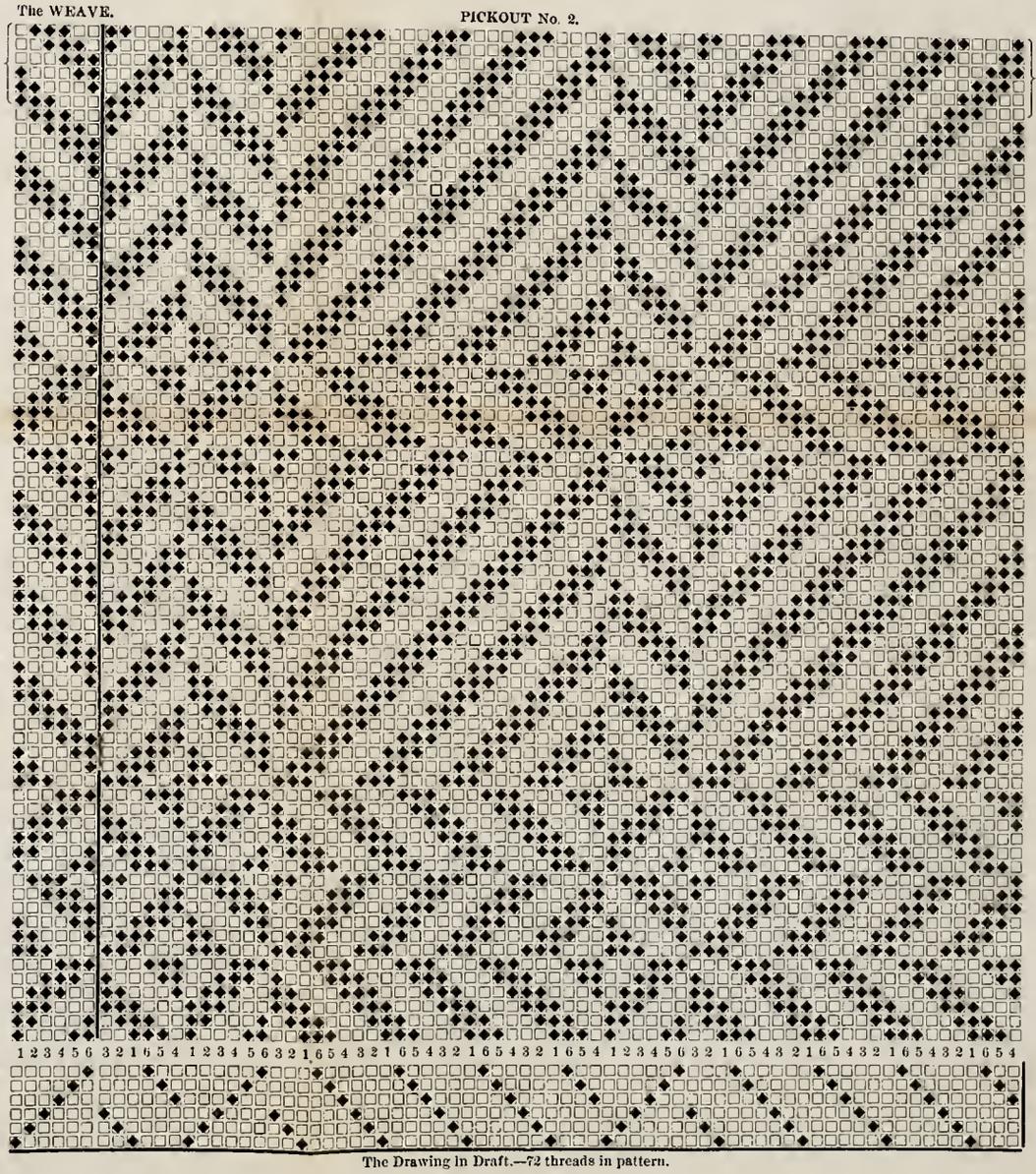


Front—24 Bolts of Chain.

Front—24 Bolts of Chain.

The WEAVE.

PICKOUT No. 2.



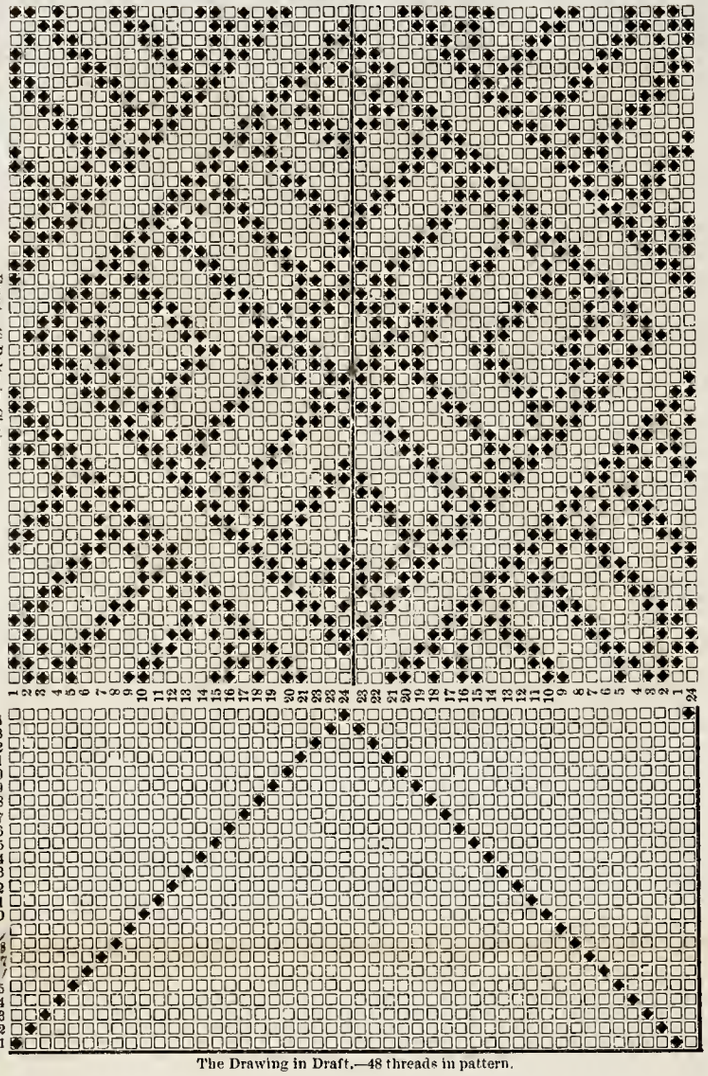
Front 72 Bolts of Chain.

Let these numbers represent The harness.

The Drawing in Draft.—72 threads in pattern.

Plate No. 2.

THE WEAVE.

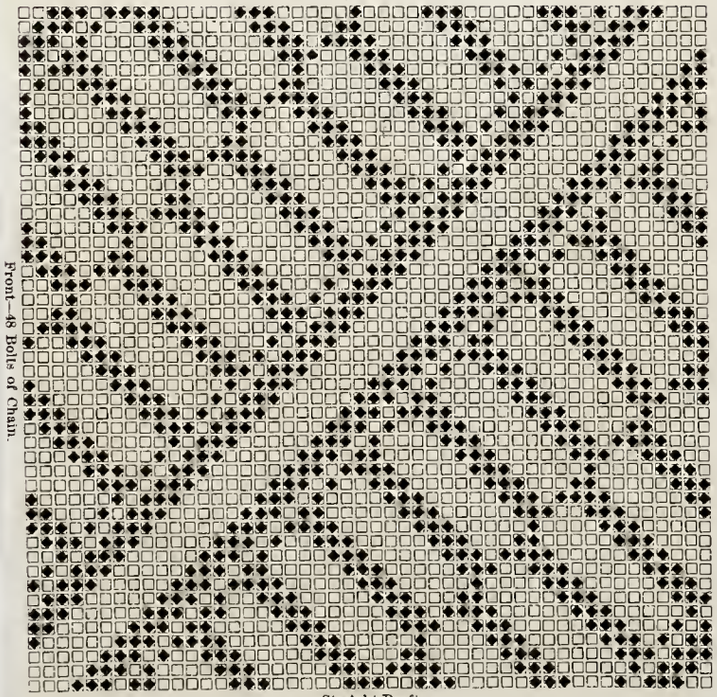


PICKOUT No. 3.

Front—48 Bolts in Chain.

The Drawing in Draft.—48 threads in pattern.

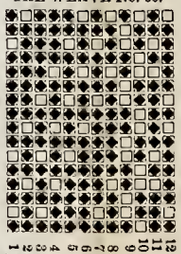
A 48 harness, WEAVE No. 37.



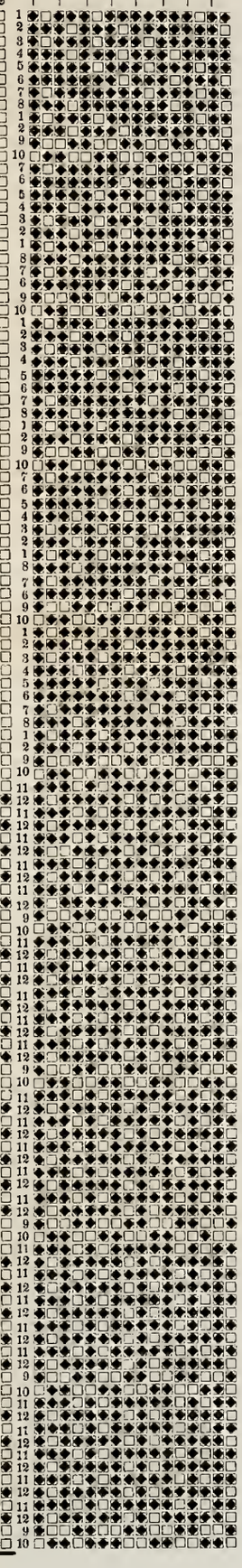
Straight Draft.

Front—48 Bolts of Chain.

THE WEAVE No. 50.



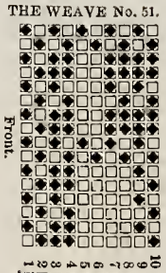
Front.



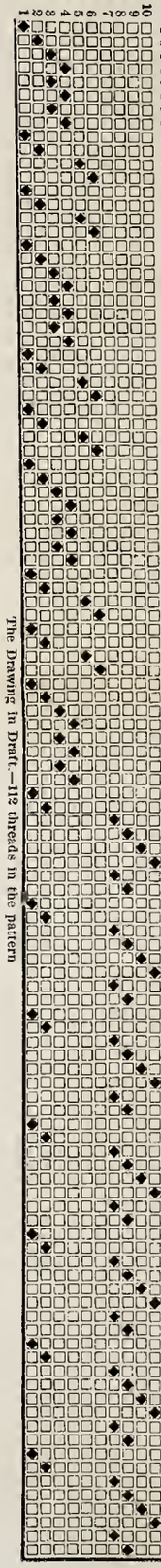
The Drawing in Draft.—120 threads in the pattern.

PICKOUT No. 6.

THE WEAVE No. 51.

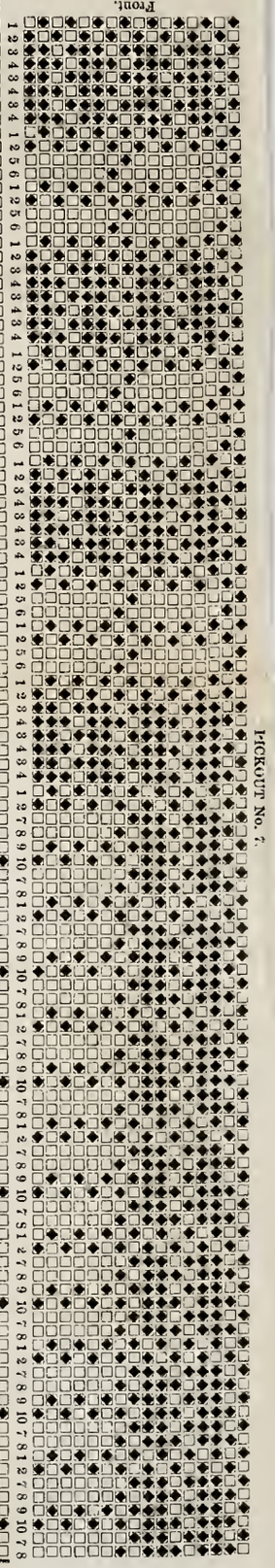


Front.



The Drawing in Draft.—112 threads in the pattern

PICKOUT No. 7.



Front.

Plate No. 3.

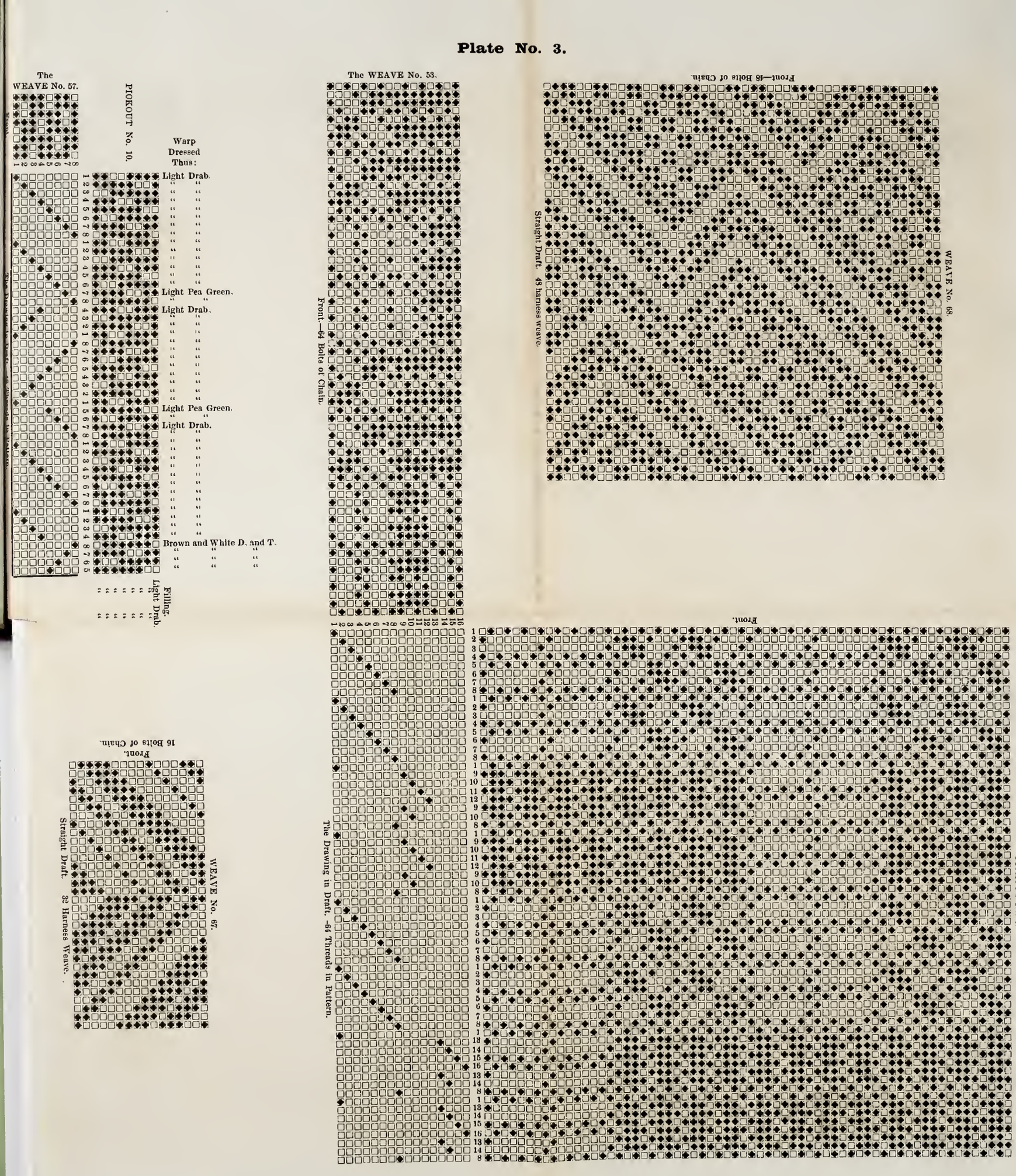
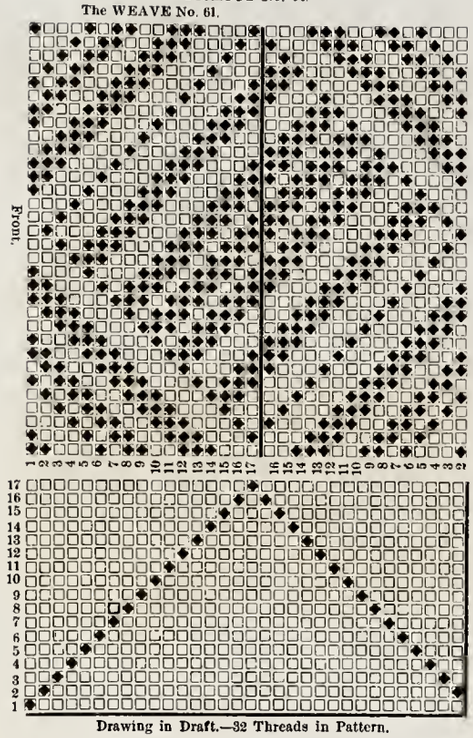

The WEAVE No. 57.
PICKOUT No. 10.
Warp Dressed Thus:
Light Drab.
Light Pea Green.
Light Drab.
Light Pea Green.
Light Drab.
Brown and White D. and T.
Filling. Light Drab.
The WEAVE No. 53.
Front.—64 Bolts of Chain.
Front—48 Bolts of Chain.
WEAVE No. 68.
Straight Draft. 48 harness weave.
Front.
PICKOUT No. 9.
The Drawing in Draft, -64 Threads in Pattern.
Front.
16 Bolts of Chain.
WEAVE No. 67.
Straight Draft. 32 Harness Weave.

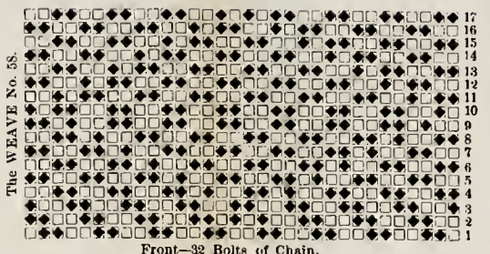
Plate No. 4.

PICKOUT No. 14.

The WEAVE No. 61.

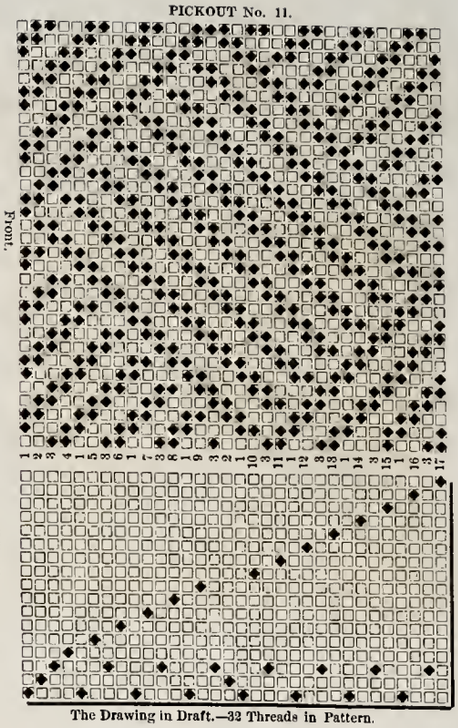


Drawing in Draft.—32 Threads in Pattern.



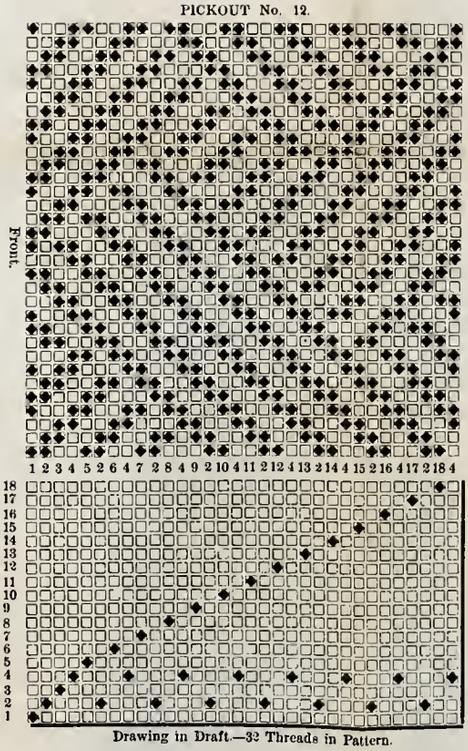
Front—32 Bolts of Chain.

PICKOUT No. 11.

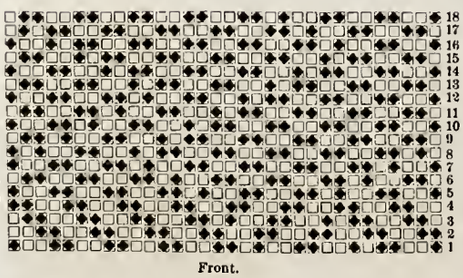


The Drawing in Draft.—32 Threads in Pattern.

PICKOUT No. 12.

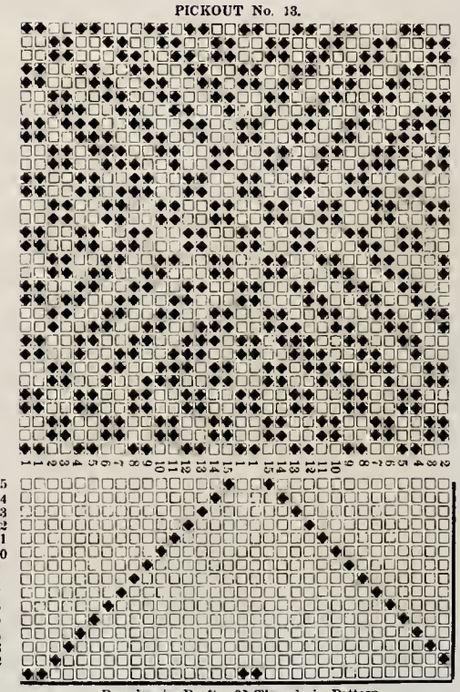


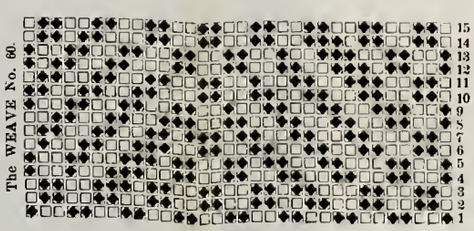
Drawing in Draft.—32 Threads in Pattern.



Front.

PICKOUT No. 13.



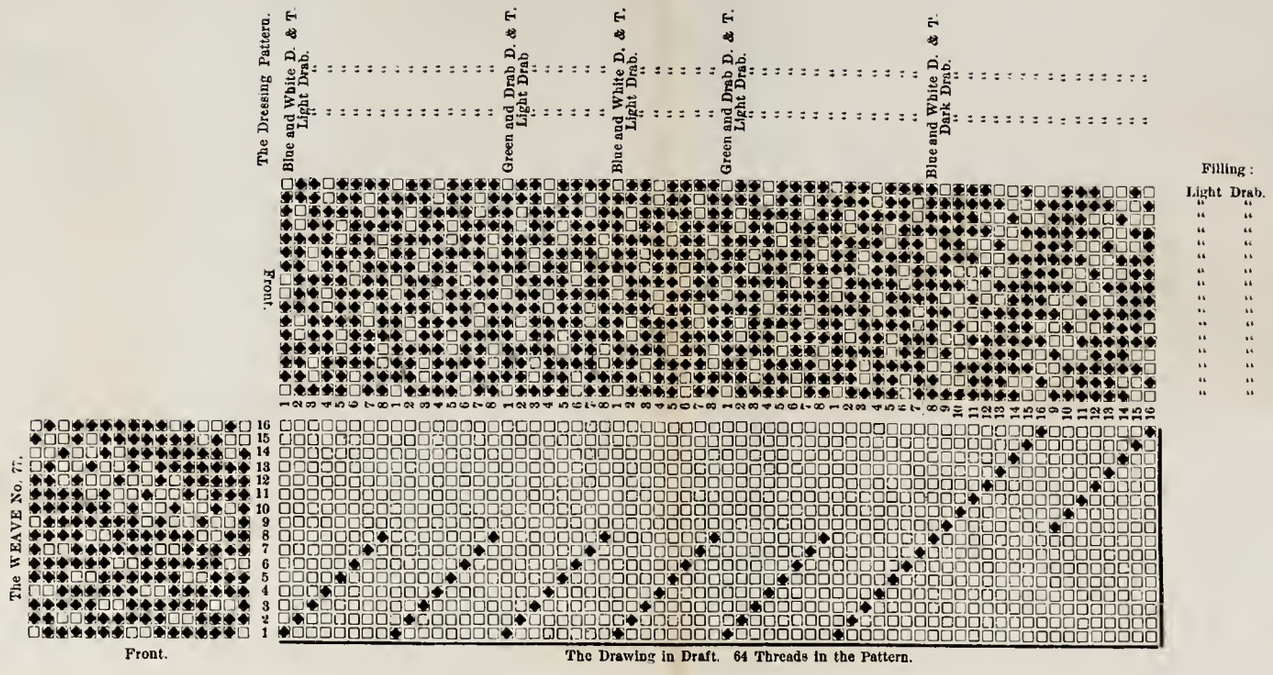


Front.

Drawing in Draft.—32 Threads in Pattern.

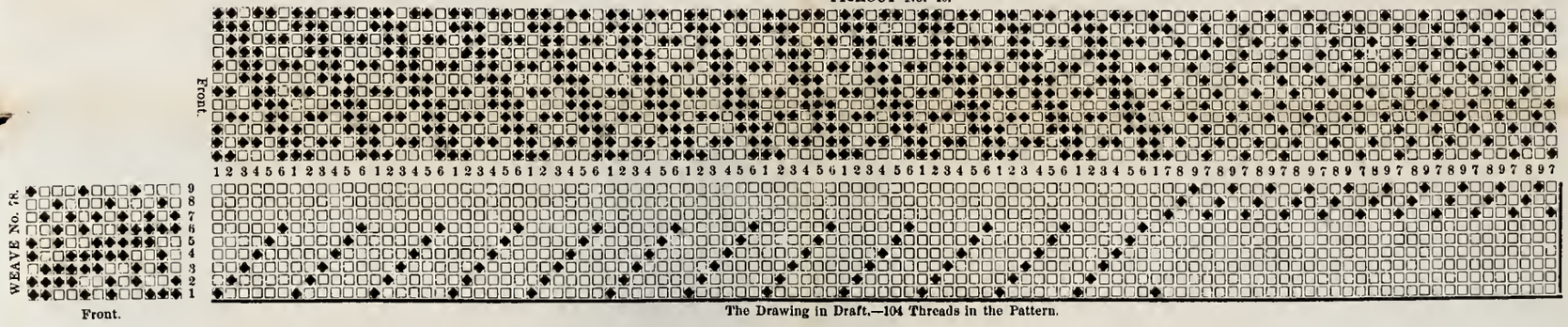
Plate No. 5.

PICKOUT No. 15.



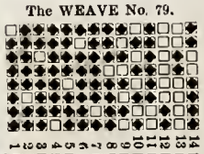
The Drawing in Draft. 64 Threads in the Pattern.

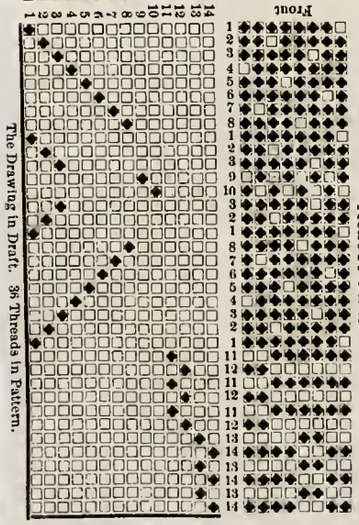
PICKOUT No. 16.



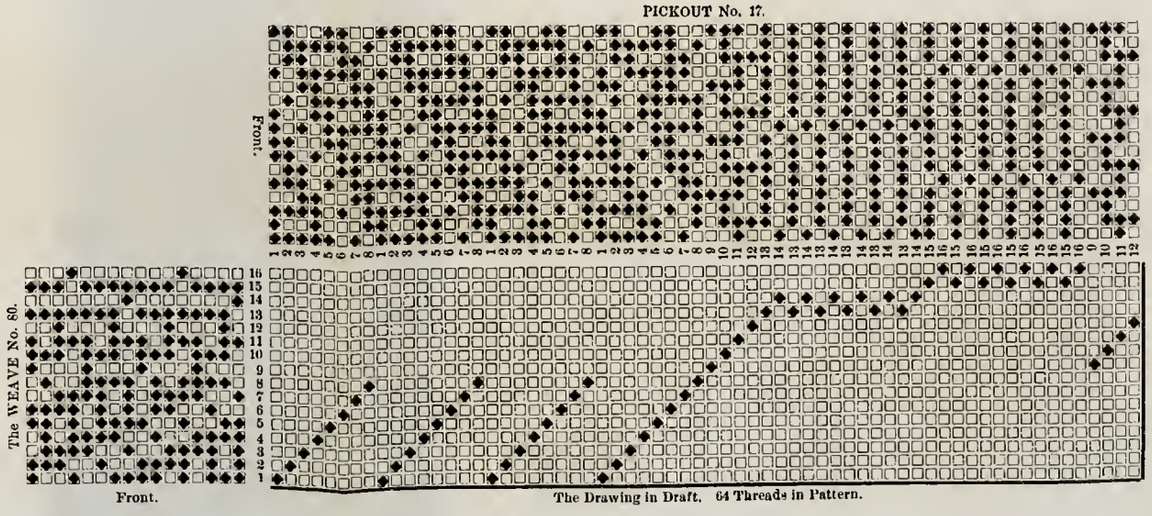
The Drawing in Draft.—104 Threads in the Pattern.

The WEAVE No. 79.





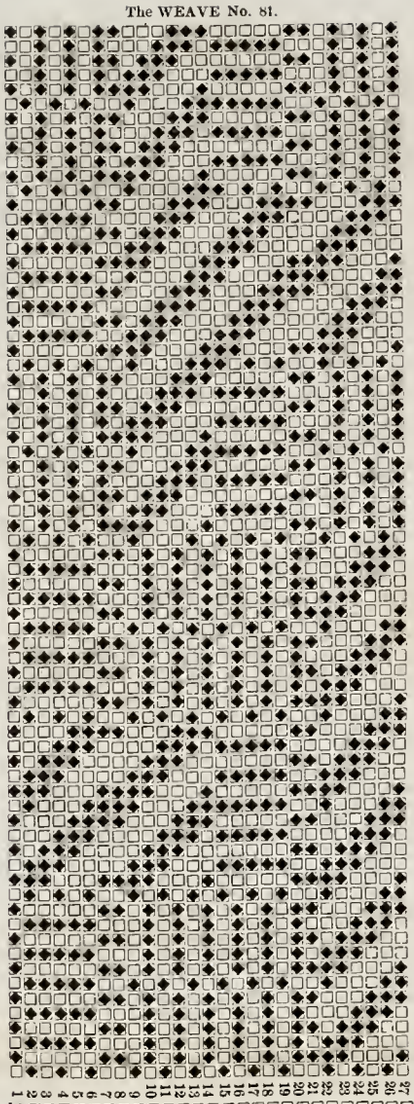
PICKOUT No. 17.



The Drawing in Draft. 64 Threads in Pattern.

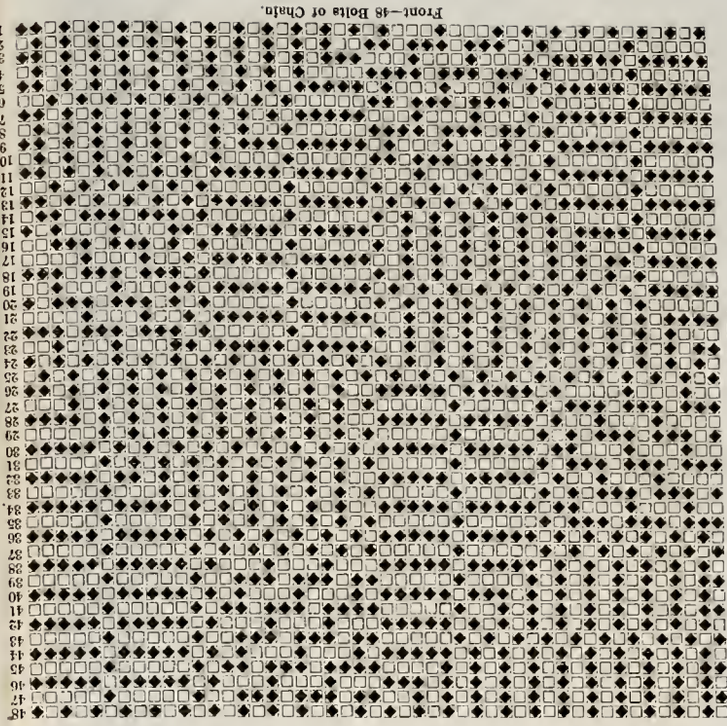
Plate No. 6.

The WEAVE No. 81.



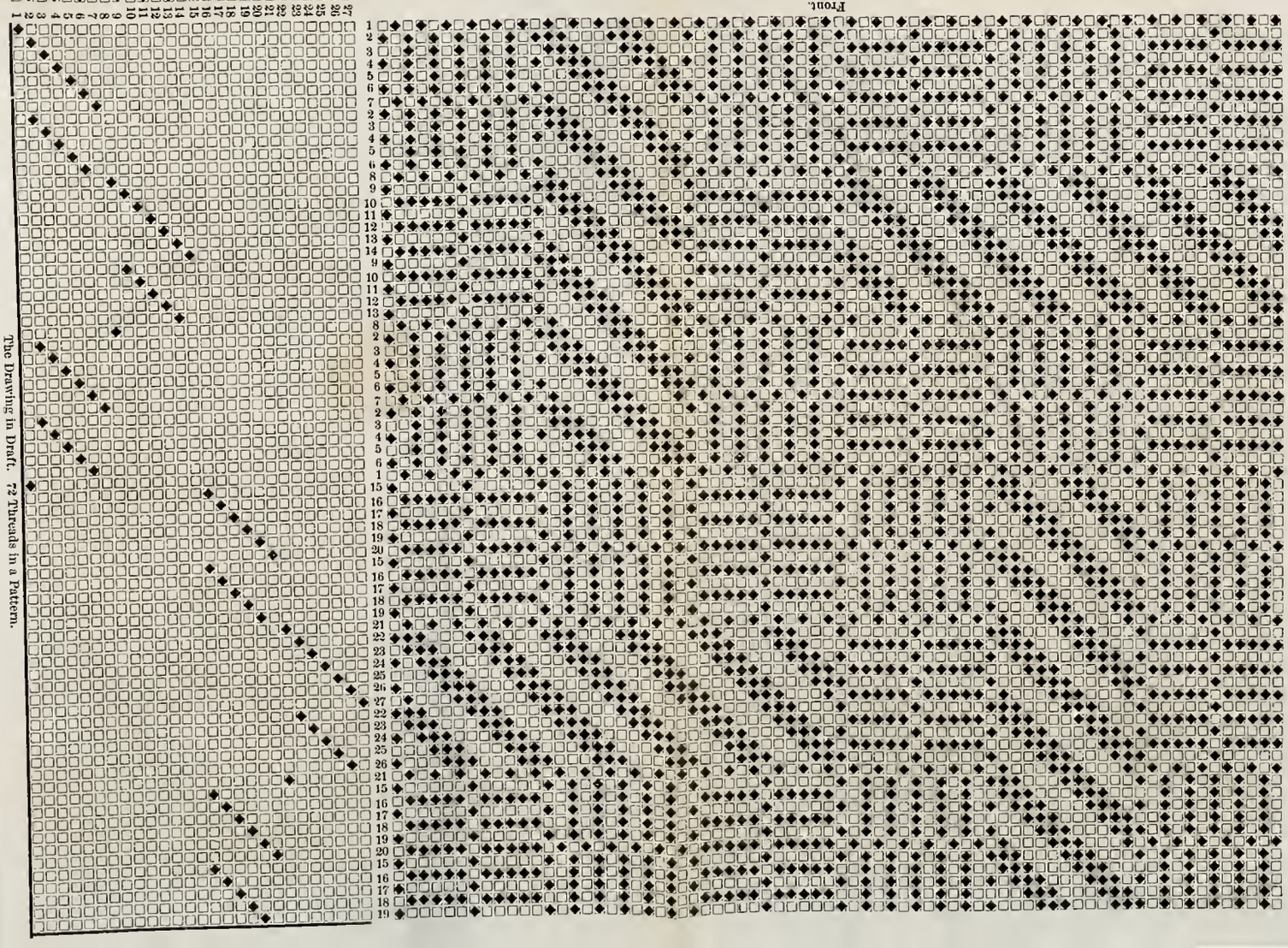
Front—72 Bolts in Chain.

Front—18 Bolts of Chain.



WEAVE No. 82.

Front.



The Drawing in Draft. 72 Threads in a Pattern.

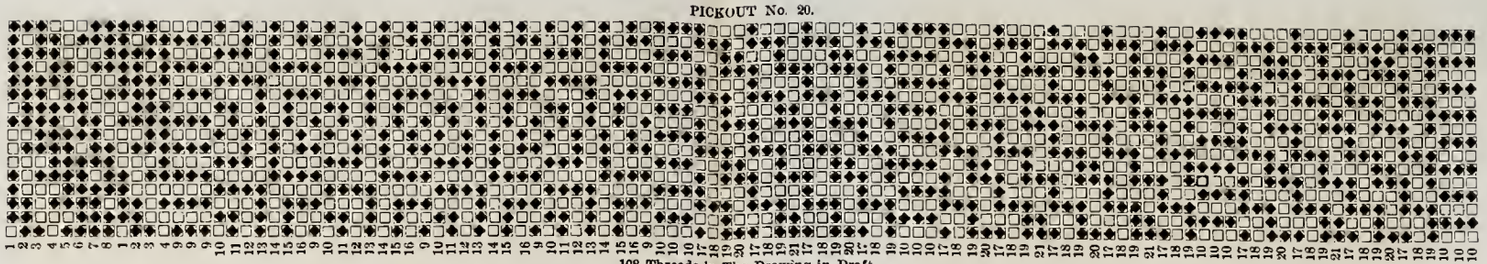
PICKOUT No. 19.

Plate No. 7.

PICKOUT No. 20.

21 harness Weave. 16 bars.

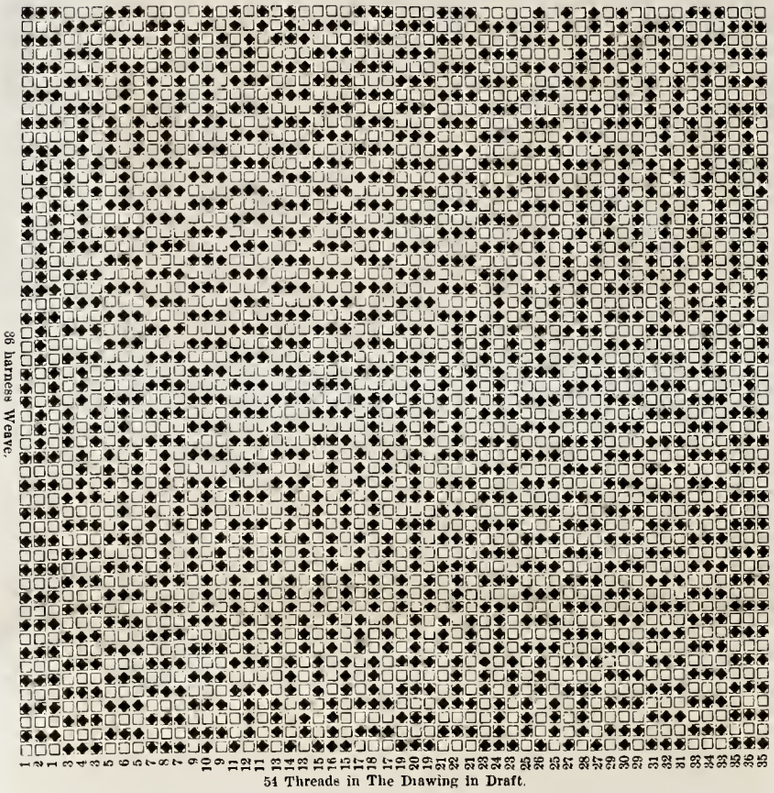
Front.



108 Threads in The Drawing in Draft.

PICKOUT No 22.

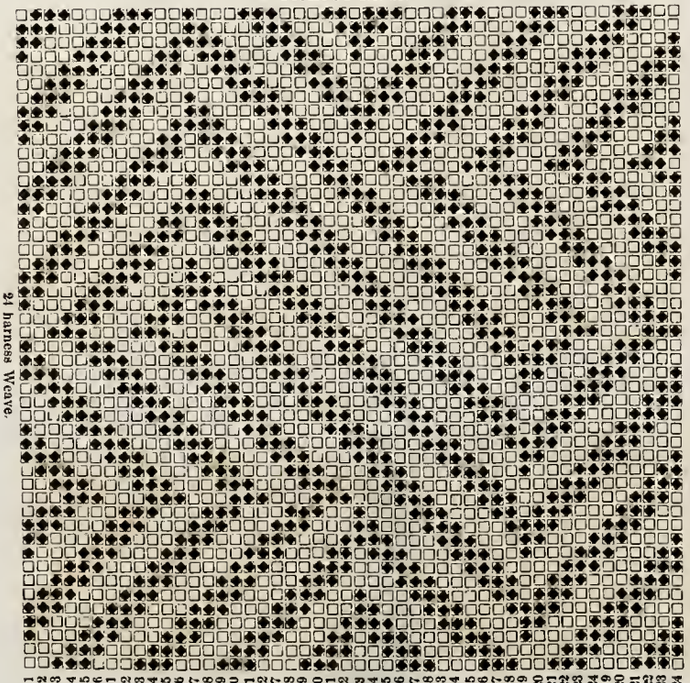
36 harness Weave. 54 Bars. Front.



54 Threads in The Drawing in Draft.

PICKOUT No. 23.

24 harness Weave. 48 Bars. Front.

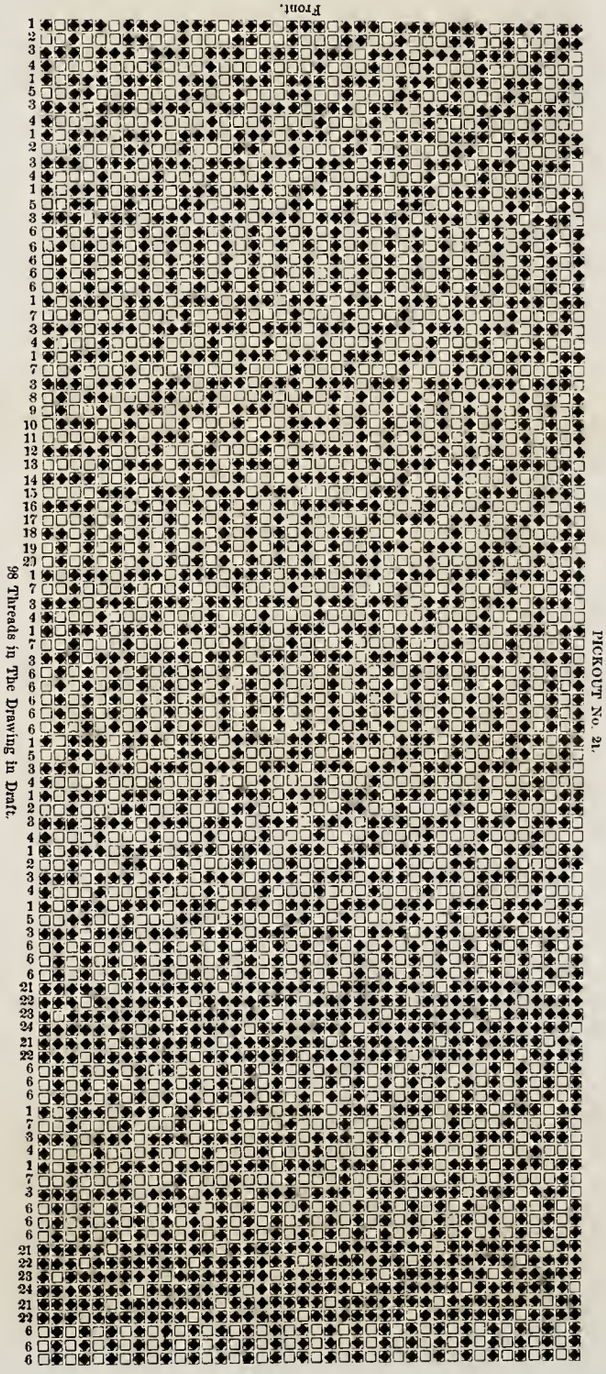


54 Threads in The Drawing in Draft.

PICKOUT No. 21.

24 harness Weave. 40 Bars.

Front.

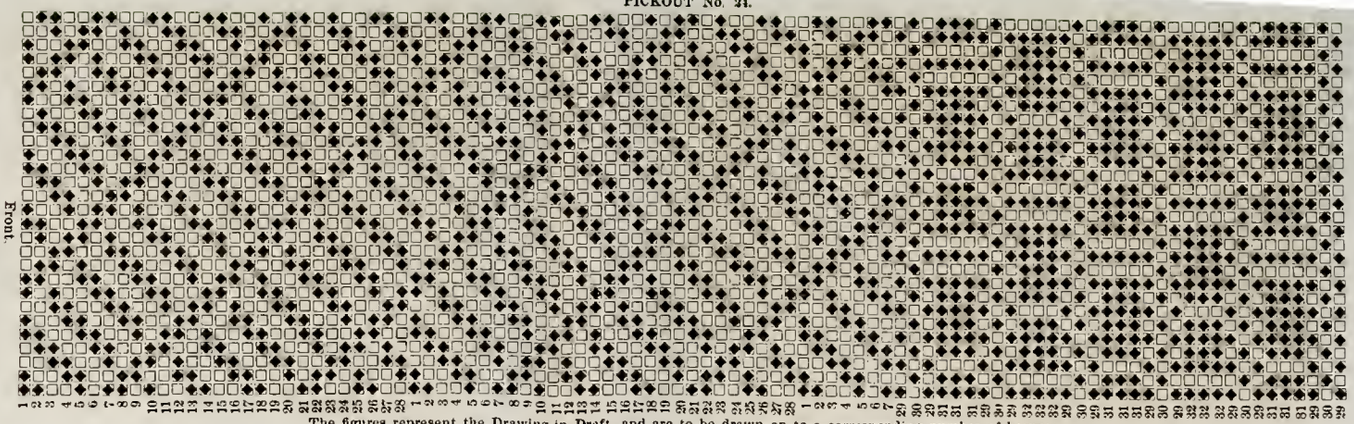


98 Threads in The Drawing in Draft.

PICKOUT No. 24.

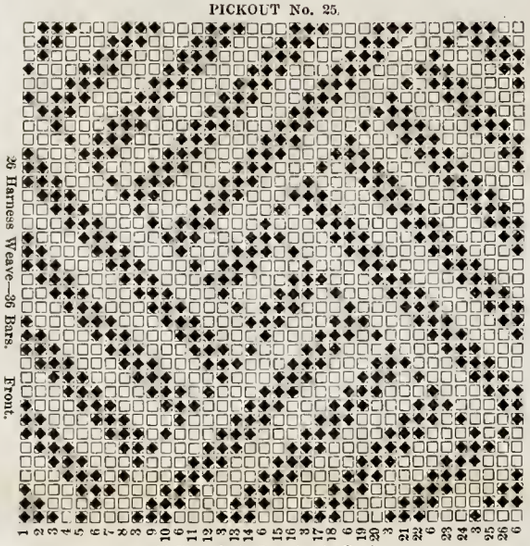
32 Harness Weave.
28 Bars.

Front.



The figures represent the Drawing in Draft, and are to be drawn on to a corresponding number of harness.
96 Threads in the Drawing in Draft.

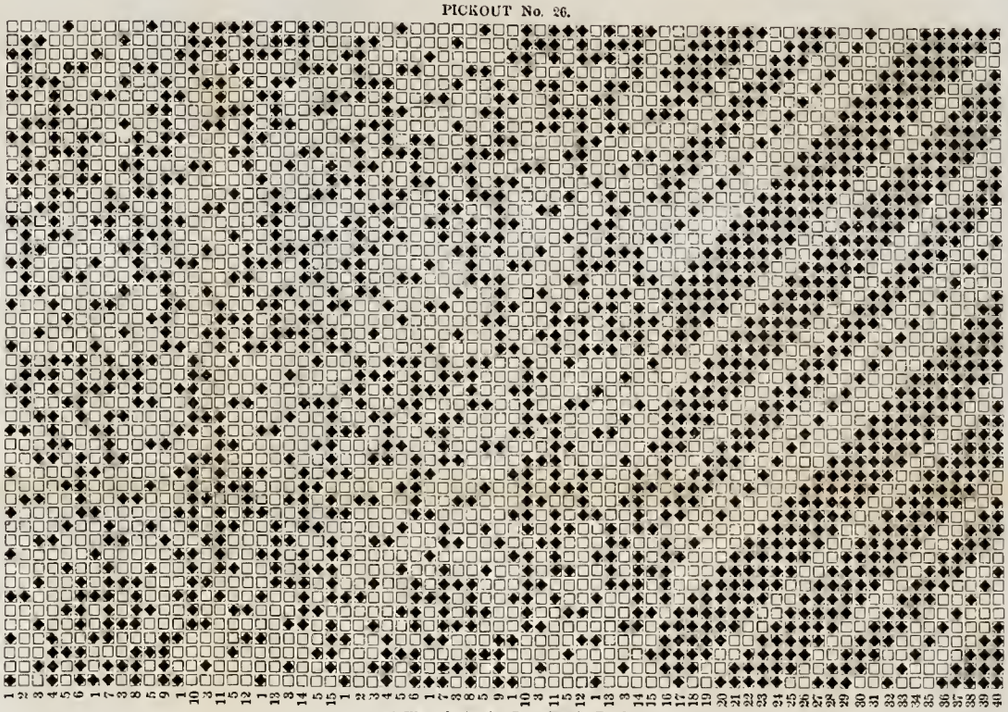
PICKOUT No. 25.



36 Harness Weave—36 Bars.
Front.

36 Threads in Drawing in Draft.

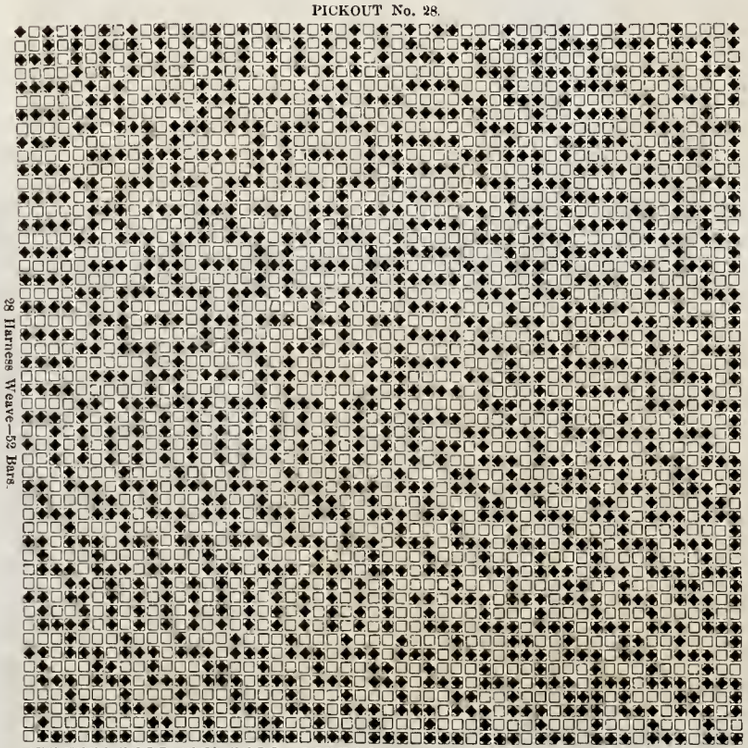
PICKOUT No. 26.



40 Harness Weave—48 Bars.
Front.

72 Threads in the Drawing in Draft.

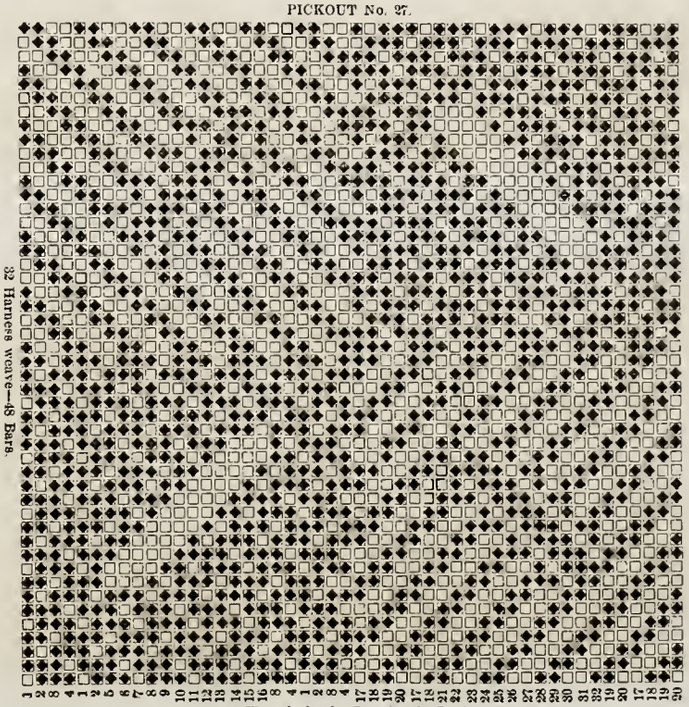
PICKOUT No. 28.



28 Harness Weave—52 Bars.
Front.

52 Threads in the Drawing in Draft.

PICKOUT No. 27.

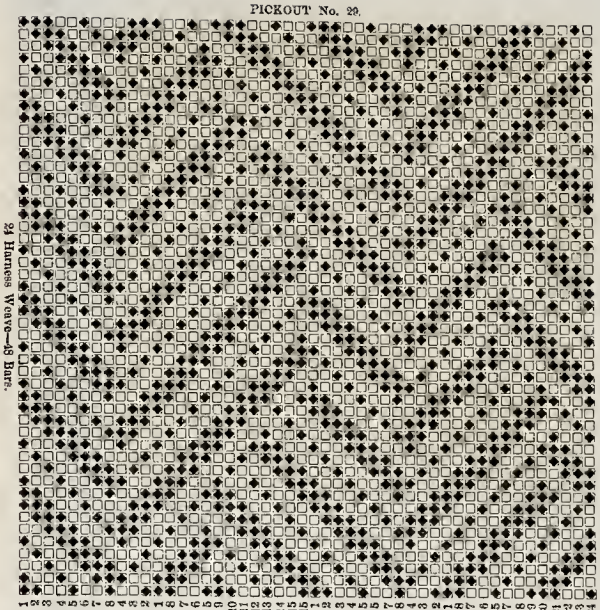


32 Harness weave—48 Bars.
Front.

48 Threads in the Drawing in Draft.

PLATE No. 9.

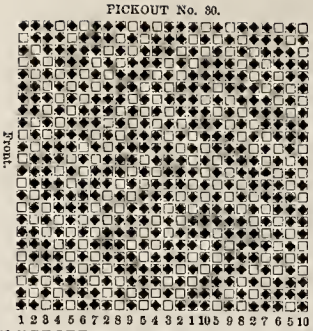
PICKOUT No. 29.



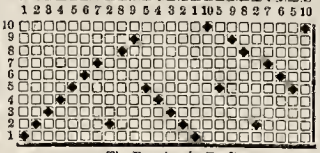
24 Harness Weave—48 Bars.
Front.

48 Threads in the Drawing in Draft.

PICKOUT No. 30.

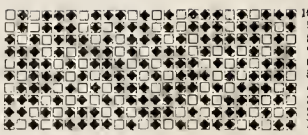


Front.



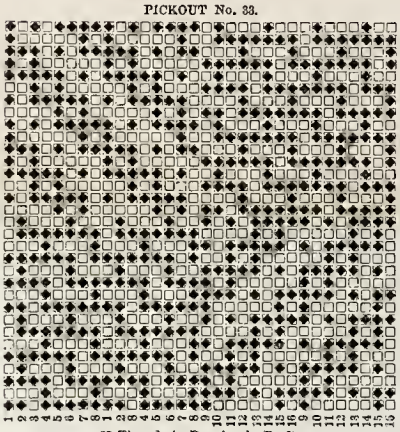
The Drawing in Draft.

The WEAVE No. 83.



Front.

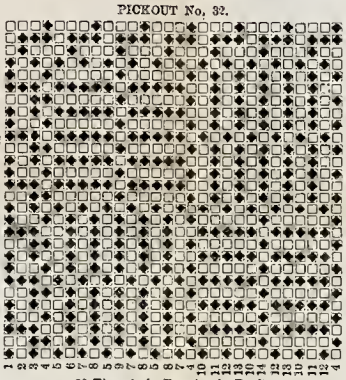
PICKOUT No. 33.



16 Harness Weave—32 Bars.
Front.

32 Threads in Drawing in Draft.

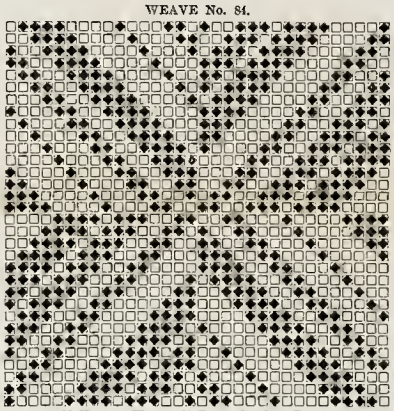
PICKOUT No. 32.



14 Harness Weave—28 Bars.
Front.

28 Threads in Drawing in Draft.

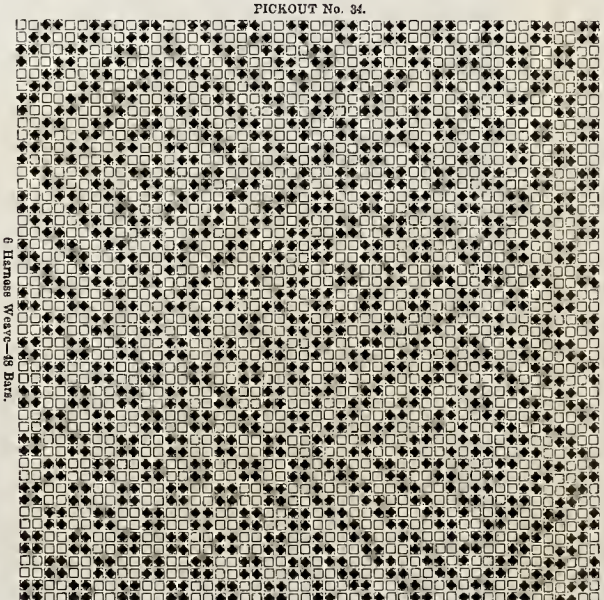
WEAVE No. 84.



Front.

32 Harness Weave—32 Bars. Straight Draft.

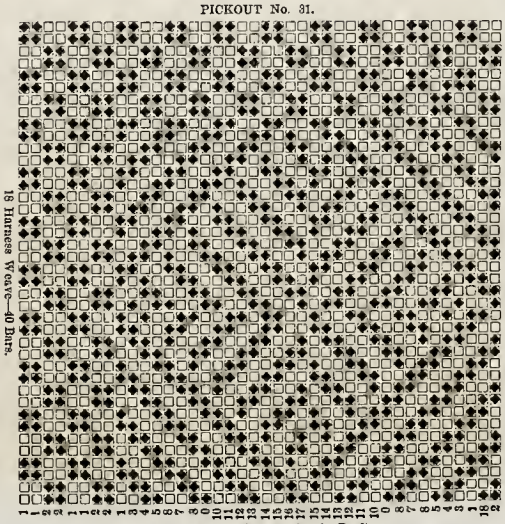
PICKOUT No. 34.



6 Harness Weave—48 Bars.
Front.

48 Threads in the Drawing in Draft.

PICKOUT No. 31.



18 Harness Weave—40 Bars.
Front.

40 Threads in the Drawing in Draft.

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